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ZOOLOGY

OF

NEW-YORK,

OR THE

NEW-YORK FAUNA;

COMPRISING DETAILED DESCRIPTIONS OF ALL THE ANIMALS HITHERTO OBSERVED WITHIN THE STATE OF NEW-YORK, WITH BRIEF NOTICES OF THOSE OCCASIONALLY FOUND NEAR ITS BORDERS, AND ACCOMPANIED BY APPROPRIATE ILLUSTRATIONS.

BY JAMES E. DE KAY.

LIBRARY OF THE BOSTON SOCIETY OF NATURAL HISTORY

PART III.

REPTILES AND AMPHIBIA.

Cc—a-11

ALBANY:
PRINTED BY W. & A. WHITE & J. VISSCHER.

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SAMUEL YOUNG,

Secretary of State.

Albany, 1842.

PREFACE.

So general is the repugnance of mankind to the animals composing these classes, that their study has been overlooked, and they have usually been considered as beings which it was not only necessary but meritorious to destroy. A part of this vulgar prejudice is derived from education, and perhaps some of it may originate from the fact that several of them are furnished with venomous fangs, capable of causing intolerable sufferings and death. To the naturalist and physiologist, however; to those who study nature through her various modifications of form and structure, they present some of the most interesting objects of contemplation. Their utility, either in diminishing various noxious animals, or in furnishing food themselves to others, has been lost sight of; and because they were cold to the touch, with a naked slimy skin without hair or feathers, they have been considered as loathsome and hideous, although their structure displays as much of the omnipotence and care of the Creator as can be seen in those which are considered to be the most gorgeous and beautiful of his animated beings.

The number of known Reptiles and Amphibia throughout the world has been variously estimated. It seems to be considered by some writers to reach to 1,300 species, whilst others suppose that 1,500 would scarcely comprise them all. As the greater number inhabit the torrid zone, we are not to expect to find many in the United States. In this work we have enumerated one hundred and sixty-one species, and have described and figured sixty-three species as found in the State of New-York; but we suppose the list to be far from being exhausted, more particularly among the Amphibians.

Descriptions of a few species may be found in the writings of Kalm, Schoepff, Bosc, Palisot de Beauvois and Daudin; but these are often confused and contradictory, and drawn up from altered cabinet specimens. In many cases, animals

not even belonging to this continent have been attributed to New-York, simply because they were sent by a collector from that place. Thus the *Homolopsis carinicauda* of Brazil, and the *Platydactylus milberti*, a species probably existing west of the Cape of Good Hope, have been described as belonging to this State. Often writers, in describing the *Cyclura harlani*, an animal probably from tropical America, state they have reason to believe that it is common in New-York. But it is chiefly to the labors of American naturalists that we are indebted for our knowledge of the Reptiles and Amphibians of the United States.

Mr. Say has given us descriptions of several new Serpents and Tortoises; Dr. Green first investigated the numerous family of Salamanders; and Major Le Conte has described several new Tortoises and Frogs, and elucidated the previous doubtful or obscure species of the older writers. To Dr. Harlan we are indebted for almost all the knowledge which we possess in relation to those remarkable families among the Amphibians, which were for a long period known under the name of doubtful reptiles.

Dr. Holbrook, in his excellent and beautifully illustrated work, entitled North American Herpetology, has enlarged our acquaintance with every department among these classes, and his volumes will long remain a monument of his genius and his zeal. Dr. Holbrook has recently remodelled this work; and at the moment that these pages are passing through the press, is engaged in publishing a second edition, in five quarto volumes, with many important additions. To his kindness I am indebted for the privilege of being permitted to examine most of what has already been printed, and it has suggested many valuable improvements in the present volume.

To Major Le Conte, I have to express my thanks for his assistance in the course of this work, which owes several of its illustrations to his pencil. Dr. Emmons, of the Geological Survey, has also afforded me valuable aid in obtaining some species which might otherwise have escaped my observation.

J. E. DE KAY.

The Locusts, Queens County.
January 1, 1842.

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SYNOPSIS

OF THE

GENERA OF THE REPTILES AND AMPHIBIANS OBSERVED IN THE STATE OF NEW-YORK.

REPTILIA:

Orders.	Families.	Genera.
Chelonia,	Chelonidæ,	Chelonia. Sphargis. Trionyx. Chelonura. Emys. Kinosternon. Sternothærus. Cistuda.
Sauria,	Scincidæ,	Scincus.
	Agamidæ,	Tropidolepis.
Ophidia,	Coluberidæ,	Coluber. Tropidonotus. Leptophis. Calamaria. Heterodon.
	Crotalidæ,	Trigonocephalus. Crotalus.

AMPHIBIA.

Ranidæ,	Rana. Scaphiopus. Bufo. Hylodes. Hyla.
Salamandridæ,	Salamandra. Triton.
Sirenidæ,	Menobranchus.
Amphiumidæ,	Menopoma.

THE NEW-YORK FAUNA.

CLASS III. REPTILES.

VERTEBRATED ANIMALS, RESPIRING BY LUNGS, WITH RED AND COLD BLOOD. HEART TRILOCULAR, OR COMPOSED OF TWO AURICLES AND A SINGLE VENTRICLE. EXTREMITIES VARYING IN NUMBER, OR ENTIRELY WANTING. BODY COVERED WITH HORNY OR CARTILAGINOUS PLATES, OR WITH HARD SCALES. REPRODUCTION BY A PREVIOUSLY FECUNDATED EGG, WHICH IS HATCHED AFTER LEAVING THE BODY, OR IN ITS PASSAGE FROM THE PARENT. UNDERGO NO STRUCTURAL METAMORPHOSIS IN THE COURSE OF THEIR GROWTH. TERRESTRIAL OR AQUATIC. HIBERNATE IN TEMPERATE REGIONS. CARNIVOROUS FOR THE MOST PART. NUMEROUS IN THE TORRID ZONE. SOME ARE POISONOUS.

Obs. We have deviated from the arrangement of Cuvier, who united together in one class animals which he had himself demonstrated to be very different in their organization. In separating his order Batrachia from the Reptiles, we follow the path which he has indicated, and shall point out briefly the most important characteristics which distinguish these two allied classes. In adopting this course, we are supported by the authority of eminent herpetologists.

ORDER I. TESTUDINATA.

This is at once recognized by the bony or cartilaginous covering above and beneath; leaving the head, neck, limbs and tail free. Feet four. Jaws toothless. The vertebræ of the neck and tail only, visible.

Obs. This order, which may be described as having its skeleton external, is very natural and precise. It has, however, obscure affinities through Chelonura with the following order.

It contains about one hundred and thirty species distributed throughout the globe, and has been divided into several families by various systematists. It is susceptible of division into two principal groups, which may be thus designated:

1. *Apalodermata.* Outer shell coriaceous or cartilaginous;
2. *Scleroderma ta.* Shell hard and bony.

We recognize but one family.

FAMILY CHELONIDÆ.

Body covered by two bony or cartilaginous plates, the one above formed by an expansion of the vertebræ and ribs; the other, by a similar expansion of the sternum, which, in some genera, is divided into several movable pieces. Jaws with cutting edges, but no true teeth. Feet with 2 – 5 claws, sometimes wanting, occasionally fin-shaped.

Obs. The animals of this family are carnivorous or herbivorous. They are strictly oviparous; hiding their eggs in sand, and leaving them to be hatched by the heat of the sun. Some are exclusively aquatic; others exclusively terrestrial; whilst others appear to live equally on land or in the water.

Thirty-five species, arranged under nine genera, have been described by authentic writers as inhabiting the United States and its territories. In this State, we describe eighteen species.

GENUS CHELONIA.

Feet fin-shaped, elongate, depressed, not retractile, beneath the shell. Shell covered with horny plates. Aquatic; living in the ocean. Some of the species useful as food to man; others employed in the arts.

THE GREEN TURTLE.*

CHELONIA MYDAS.

Testudo mydas. L. Syst. Nat.
T. viridis. SCHNEID. Schild. pl. 17, fig. 2.
Green Turtle. CATESBY, Car. Vol. 2, p. 38. AUD. Orn. Biog. Vol. 2, p. 370.
Tortue franche. DAUD. Hist. Rept. Vol. 2, p. 10, pl. 16, fig. 1. Griffith's Cuv. Vol. 9, p. 15 and 88.
Chelonia mydas. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 25, pl. 3.

Characteristics. Shell sub-cordate, pointed behind. Scales either carinate or imbricate. Two claws on each foot. Length 2 – 6 feet.

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* The word *turtle*, originally corrupted from *tortoise*, has now grown into such general use, as its equivalent, that it would seem pedantic to avoid employing it. By *Turtle*, we would more especially designate the *Marine Tortoises*, although by usage it is applied to a few others.

Description. Shell smooth, slightly keeled in the centre; composed of thirteen plates, viz. five vertical plates which are hexagonal, and four lateral plates on each side. Marginal plates twenty-seven; the anterior broader than long; the posterior pointed behind, and the last two emarginate. Sternum convex, composed of six pair, with three supplementary ones on each side. Head elongated, compressed at the sides. Fore feet in the shape of fins, longer than those behind. Two nails, flat, 0·75 long, on the anterior edge of each fore foot; two similar but shorter nails on the posterior feet. Tail very short, conical.

Color. A dull greenish, inclining to olive brown.

Length, ...	23·0.	Transverse diameter, ...	20·0.
Fore leg, ...	13·0.	Hind leg, ...	10·0.

The above notes were made from an individual which came on shore near my residence, September, 1840, on the northern coast of Long Island. It is certain that this species is a native of the tropical seas, and of course such an occurrence must be considered as purely accidental. In reference to the geographical distribution of animals, the enumeration of this species as an inhabitant of the waters of the coast of New-York would lead us into error, by enlarging unnecessarily its ordinary geographical limits. In preparing, however, a work designed to illustrate the Fauna of this State, and for the instruction of the student who may accidentally meet with other specimens, we have deemed it useful to insert this brief notice. My friend Mr. I. Cozzens, a well known practical naturalist and excellent observer, informs me that he has, *on several occasions*, seen them in the New-York Market, which had been captured off Sandy Hook, and near Coney Island.

The Green Turtle is well known to the epicure for its delicious steaks, and the savory soup which it affords. Along the coast of Florida, it approaches the shores in the early part of summer, and deposits its eggs in a hole scraped in the sand, where they are hatched by the heat of the sun in the course of two or three weeks.

(*EXTRA-LIMITAL.*)

C. caretta. Hawksbill Turtle. (Holbrook, Vol. 2, pl. 4.) Orbicular; carinated above. Head very large; when young, the nose elongated. *Gulf of Mexico.*

C. imbricata. Tortoise-shell Turtle. (Holbrook, Vol. 2, pl. 5.) Subcordate; scales imbricate, yellow rayed and spotted with brown. *Gulf of Mexico.*

GENUS SPHARGIS. *Merrem.*

Body covered above by a leathery skin instead of scales. The ribs not soldered together, and not united to the almost membranous sternum by the marginal plates. This covering is tubercular in the young, but elevated into distinct ridges in the adult. Feet fin-shaped, without nails.

Obs. This genus was first indicated by Merrem. The names of *Corindo*, *Dermochelis* and *Dermatochelys* have been successively proposed by Fleming, De Blainville and Wagler.

THE LEATHER TURTLE.

SPHARGIS CORIACEA.

(PLATE V. FIG. 9.)

Testudo coriacea. Lin. 12 ed. p. 350.
Tortue luth. Daud. Hist. Rept. Vol. 2, p. 62, pl. 18, fig. 1.
T. coriacea. Mitchill, Med. Rep. New Series, 1812, p. 191, and 1813, figure.
Sphargis id. Griffith, Cuv. Vol. 9, p. 17, and 88 plate. Gray, Synops. p. 20.
S. id. Bonap. Faun. Ital. figure. (Young.)
S. id. Storer. Mass. Rep. p. 217, plate 4. Holbrook, N. Am. Herp. Vol. 2, p. 45, pl. 6.

Characteristics. Shell with seven longitudinal ridges, truncated in front, pointed behind. Length 6 – 8 feet.

Description. Upper surface smooth and polished, of a leathery appearance, truncate, emarginate in front, with a rather elongated process on the sides of the neck, obtusely pointed behind. Surface of the shield divided into separate oblong compartments by seven equidistant longitudinal ridges, which are obsoletely nodulous, becoming more indistinct behind: The first runs along the dorsal ridge; the next on each side commencing in advance of the dorsal ridge, and approaches it behind; the third pair on each side begins posterior to the first; the last ridge is formed by the margin of the shell. These ridges are acute, slightly interrupted on the edge. Beneath, smooth, of a somewhat softer consistence. Head smooth, compressed nearly to an edge anterior to the eyes. Jaws sharp, the upper emarginate in front to receive the acute hooked point of the lower jaw; on each side of the central notch is another, not quite as deep, and more rounded. Strong spinous processes in the roof of the mouth, and in the œsophagus. Nostrils small, circular, and placed behind the tip of the snout. Eyes large, opening obliquely. Anterior feet smooth, elongated, ending in a blunt point, and twice the length of the posterior pair. Posterior feet rounded, or rather obliquely truncated behind, with a softer margin. Tail pyramidal, compressed laterally, pointed, and extending beyond the shell.

Color, of the head and buckler, dull blackish brown, and in the fresh state with a bluish tinge. Extremities obsoletely spotted with greyish. The under parts marbled with blackish, on a yellowish or soiled whitish ground.

Total length,..... 70·0.
Ditto of the shield,..... 68·0.

The young of this species presents strong and numerous variations from the adult. The skin, instead of being smooth, is roughened with tubercles. The ridges are composed of a series of rounded tubercles. The head is larger in proportion; the pupil vertical, and the sternum with five longitudinal ridges.

This gigantic species, which breeds on the Tortugas or Turtle islands, and on the Bahama islands and keys, visits our coast sufficiently often to entitle it to a place in our Fauna. It was first noticed on our coast in 1811, and described and figured by Dr. Mitchill. In 1816, another individual of a large size was captured off Sandy Hook, and is now in the American Museum of New-York, set up in a very false and grotesque manner. A third species was taken in 1824, in Massachusetts Bay, and is described in the Report cited above by Dr. Storer. A fourth specimen was taken September 7, 1826, in Long Island Sound; and another in 1840, in Chesapeake Bay.

The Leather Turtle, although a native of tropical American seas, is a great wanderer: it has been seen on the coast of England, and in the Mediterranean. We are not in possession of sufficient evidence to determine whether the large leather turtle seen in the Pacific and Indian oceans belong to this species. The food of our turtle is said to consist of fish, shells and marine plants.

Lesueur is said to have described another species? under the name of *Dermochelis atlantica*; but I have been unable to find the description.

GENUS TRIONYX. *Geoffroy.*

Shell without scales, and, together with the sternum, cartilaginous, and extending over the edges into a flexible margin. Feet palmated, with three sharp claws. A corneous beak, covered with fleshy lips. Nose produced. Vent near the extremity of the tail.

Obs. The coverings of the animals of this genus are even softer and more pliable than the preceding. The expanded ribs which form the upper shell do not extend to the margin, and the under portion is equally undeveloped. They all live in fresh-water streams, and have the reputation of being exceedingly voracious.

THE SOFT-SHELLED TURTLE.

TRIONYX FEROX.

PLATE VI. FIG. 11. YOUNG. — (CABINET OF THE LYCEUM.)

Testudo ferox et cartilaginea. GMELIN, Syst. Nat.
The Soft-shelled Tortoise. GARDEN, Phil. Transac. 1771, p. 226.
River Tortoise. PENN. Arct. Zoology, Supplement, p. 78.
La Tortue de Pennant. DAUDIN, Hist. Rept. Vol. 2, p. 68, pl. 18, fig. 2.
Trionyx spiniferus. LESUEUR, Mem. Mus. Vol. 15, p. 258, pl. 6, a, b, c.
T. ferox. SAY, Ac. Sc. Vol. 4, p. 218. LE CONTE, Ann. Lyc. Vol. 3, p. 93. HARLAN, Med. and Phys. p. 158.
T. platypeltis. FITZING.
T. amyda. SCHWEIGG.
Trionyx ferox. HOLBROOK, Am. Herpetology, Vol. 2, p. 11, pl. 1.
T. ferox. KIRTLAND, Report on the Zoology of Ohio.

Characteristics. Dusky brown. Orbicular; little elevated; the anterior margin with cuticular processes. Fore feet with three squamous folds in front, and two oblong tubercles behind. Young, with ocellate spots. Length 9 – 12 inches.

Description. Shell entire, orbicular, bony in the central parts, and cartilaginous on the margins. The anterior margin in the adult with numerous pointed tubercles, which may be faintly and distantly traced in the young. A series of raised and tuberculated lines on the disk in the adult. Under a lens, the surface of the shell appears divided into minute compartments, in which there are two concentric rings, including a small rounded central elevation; these are barely sensible to the touch. Sternum cruciform, osseous in the middle. Head large, tapering acutely to the nose, which is long and flexible, with the nostrils nearly terminal. Eyes prominent, contiguous, and almost vertical. Mouth cleft behind the eyes; jaws narrow, partly covered by the lips, which are thickened on the sides. Neck long, smooth, with a gular fold. Legs long and slender, palmate, five-toed; the web extending over the two clawless toes on both feet, and high up along the posterior margin of the hind foot. Tail short, thick, suddenly contracting to a point, and extending beyond the shell. Vent within 0·5 of the extremity of the tail. Claws robust, subtrigonal, nearly straight, the intermediate one on the hind foot longest.

Color. Shell dark slate, with numerous large ocellate spots, and with black dots chiefly along the margin. Beneath, soiled white. Head slate, punctate with black on the summit and sides. Nose light, or flesh-colored; a white stripe, margined on each side with black, proceeds from the posterior margin of the eyes, and is lost in the marblings on each side of the neck. Chin and sides of the lower jaw, together with the feet and tail, varied with black and white. Irides yellow, with a black medial stripe.

Total length,	9·0.	Length of shell,	5·3.
Ditto of head and neck,	3·0.	Diameter of shell,	5·0.
Ditto of tail,	1·7.	Height of same,	1·4.

The Soft-shelled Tortoise was not generally known as an inhabitant of New-York, until after the completion of the Erie canal, connecting the Great Lakes with the Ocean. Previous to that period, it was supposed to belong exclusively to the southern and western waters. The description given above was taken several years since, from a specimen obtained in the Mohawk river. Subsequently, several individuals, as I understand, have been taken from the Hudson river near Albany. The specimen, as I then thought, varied so much from any description of the *ferox* within my reach, that I considered it to be new, and named it *ocellatus*. An examination of many specimens, both of *ferox* and *muticus*, (which I suspect to be identical,) since that period, together with a recent reëxamination of the specimens in the Cabinet of the Lyceum, satisfies me that my *ocellatus* was nothing but the young of the *ferox*, the *première varieté* of Lesueur (Op. sup. cit. p. 261). It is, however, so peculiar, that I deemed it worthy of being drawn. The color of the adult is of a uniform dusky brown, occasionally with a few obsolete darker spots.

I am not acquainted with any other locality in this State, though I have heard of their being taken in Chautauque and Cayuga lakes. I have been assured by persons in Cattaraugus county, that they have been taken in the Allegany river, a tributary of the Ohio. Major Le Conte informs me that they are abundant both in Lake Ontario and Erie. Dr. Kirtland mentions this species as very abundant in all the streams both of the Ohio and Lake Erie. In calm weather, during summer, he observes, great numbers may be seen floating near the surface of the water. At such times, they were closely followed by several of the black bass (C. ohioensis); but he could not ascertain what attracted this usually coy fish about them.

It is much esteemed as a wholesome and nutritious article of food. They are said to feed on fish, and the smaller aquatic reptiles. The statements regarding their ferocity, which has given them their specific name, appear to vary. According to Mr. Speakman cited by Say, it is only the young who attempt to bite; and Major Le Conte observes, that they are not more inclined to bite than any other species. Dr. Eights, on the other hand, asserts that he saw "a large one from Cayuga lake dart out its head ferociously at a dog which had been "purposely brought near, and take from its side a mouthful of hair in the attempt." They are chiefly taken with a hook baited with flesh, and sometimes speared. When they show themselves above water, they are killed by the rifle.

(*EXTRA-LIMITAL.*)

T. muticus. (Les. Mem. Mus. Vol. 15, pl. 7. Holb. Vol. 2, pl. 3.) Shell elliptical, confounded with the neck, not tuberculated or spinous in front. Sternal callosities four; the two hinder large, united. Length 7 to 8 inches. *Ohio River.*

T. bartrami. (Le Conte, Ann. Lyc. Vol. 3, p. 96.) Head and neck furnished with retractile tuberculated appendages. *East Florida.*

T. harlani. (Bell, Monog.) Body more ventricose, and the soft portions of the shell less extensive than in the other species. *East Florida.*

GENUS CHELONURA. *Fleming.*

Head large, with small plates. Both jaws strongly hooked Sternum small, cruciform, immovable. Tail long, and furnished with a scaly or tuberculated crest. Anterior feet with five claws; posterior with four.

Obs. This genus is identical with the *Emysaurus* of Dumeril & Bibron, *Rapara* of Gray, and *Saurochelys* of Latreille. The *Chelydra* of Schweigger appears to have been founded on the young of the *C. serpentina.* I am acquainted with but one species in the United States. Dr. Harlan, in his Medical and Physical Researches, has indicated the existence of another from Tennessee, but has given no detailed description.

THE SNAPPING TURTLE.

CHELONURA SERPENTINA.

PLATE III. FIG. 6. YOUNG.

Testudo serpentina. L. Syst. p. 354.
T. id. DAUDIN, Vol. 2, p. 98, pl. 20, fig, 2.
Chelonura serpentina. SAY, Acad. Nat. Sc. Vol. 4, p. 217.
Chelydra lacertina. SCHWEIGG. Monog. (Young.)
Testudo serpentina. LE C. Ann. Lyc. Nat. Hist. N. Y. Vol. 3, p. 127.
Emys (Chelydra) serpentina. GRAY, Synopsis Rept. apud Griff. Cuv. Vol. 9, p. 14.
Chelydra serpentina. HARL. Med. & Phys. p. 157.
Emysaurus id. DUMERIL & BIB. Vol. 2, p. 350.
Emysaurus id. STORER, Mass. Rep. p. 212.
Chelonura id. HOLBROOK, Am. Herp. Vol. 4, p. 21, pl. 3; and Vol. 1, p. 139, pl. 23, of the 2d Ed.

Characteristics. Shell oval, more or less carinate, three-toothed on its posterior margin. Upper jaw hooked, acute. Head long and wide. Snout attenuated. Length 2 – 4 feet.

Description. Shell oval, little elevated, with a dorsal ridge produced by the elevation of the posterior margin of the vertebral plates. Five vertebral, eight lateral and twenty-five marginal plates. The first lateral plate triangular, with its outer base rounded; the remainder subquadrate, the posterior smallest. The marginal plates small, oblong, and gradually enlarging on the sides; the posterior largest, and of these, three and occasionally four with strong spinous angles. The vertebral plates are quadrate, except the last, which is pentagonal. Sternum composed of ten plates; the anterior pair small, the two following pair gradually larger. The wing or supplementary plates long and narrow, united to the marginal plates by two small plates; these wing plates are attached beneath to the pectoral and femoral pair. Caudal plates long, narrow and triangular. Head exceedingly large, scaly above. Skin of the neck loose, and thickly covered above with fleshy warts, somewhat smoother beneath. Jaws stout, the upper jaw largest. Legs robust. Fore feet covered above by series of scales, of which those on the posterior edge are largest. Hind legs with similar large scales beneath. Toes

partially webbed ; those of the fore feet almost entirely so. The claws are robust, channelled beneath, moderately curved. Tail very long, cylindrical at the base, slightly compressed on the sides, and tapering to an acute tip ; its dorsal surface crested by numerous compressed elevated scales, becoming smaller behind ; a series of large flat scales on the sides.

Young. The lateral plates form a prominent ridge on each side, becoming more elevated behind, and separated from the dorsal ridge by a broad and deep furrow. All the plates of the shell strongly marked with elevated lines radiating forwards, with slight concentric furrows. In the adult, these are obsolete. The supplementary or wing plates are united to the margin by three small plates.

Color. Dusky brown or olivaceous green above. The sternum, under side of the marginal plates, and of the neck, feet and tail, bright yellow, which becomes dull with age. Eyes brown. In a specimen from Lake Janet, Hamilton county, the under sides of the marginal plates were of a beautiful light green.

Total length,	12·0 – 48·0.
Ditto of tail,	4·0 – 16·0.

This is one of our largest turtles. It is common in every part of the State, and inhabits equally the clearest and muddiest streams. It is occasionally met with at a distance from the water, probably in search of food, or of a suitable place of deposit for its eggs. On the Raquet river, Franklin county, I found them laying their eggs in June, and we were frequently indebted to these deposits for a precarious meal. They scoop out a hole in the sand a short distance from the water, a few inches deep ; and by probing with a short stick in places indicated by the tracks of the animal, we frequently obtained as many as sixty or seventy eggs from one spot. The eggs, as well as the animal, afford a very nutritious and savory food. The larger and older animals have a strong musky flavor, which renders them unpalatable. They feed upon frogs and fishes, and snap greedily at ducks in ponds, dragging them under water to be devoured at leisure. It is this propensity to snap at every thing within its reach, which has obtained for it its popular name. In other sections, it is known under the names of *Loggerhead*, *Alligator Turtle* and *Couta*. I have frequently observed a small leech (Clepsina scabra) adhering to it.

This species appears to extend over the whole Union, but its precise geographical limits are not yet ascertained.

(*EXTRA-LIMITAL.*)

C. temmincki, (Holb. Vol. 1, pl. 24.) Head enormously large, covered above and on the sides with plates. Upper jaw hooked in front; lower jaw with a strong tooth-like process received in a cavity in the upper jaw. Shell tricarinate, concave in front, deeply emarginate and dentate behind ; marginal plates 31, placed in two rows at the flanks. Tail not crested. Length of head and neck 12 inches; of shell, 22 inches; tail, 14·0. *Mississippi.*

GENUS EMYS. *Brongniart.*

Shell not much elevated, solid, covered with horny plates. Sternum solid, broad, immovable; of six pair and four supplemental plates. Feet palmate; anterior with five claws, posterior with four.

This genus comprises nearly all the fresh water tortoises discovered in America. In this State, we enumerate nine species.

THE SALT-WATER TERRAPIN.

EMYS PALUSTRIS.

PLATE III. FIG. 5. — (STATE COLLECTION.)

Testudo palustris. LIN. GMEL.
Tortue à lignes concentriques. DAUD. Hist. Nat. Rep. Vol. 2, p. 153.
Emys centrata. SAY, Acad. Sc. Nat. Philad. Vol. 4, p. 211. HARL. Med. and Phys. p. 153.
T. palustris. LE CONTE, Annals of the Lyc. Nat. Hist. Vol. 3, p. 113.

Characteristics. Shell oval, obtusely carinate; the plates with numerous deeply impressed concentric striæ; the last vertebral plate rounded in front. Beneath, reddish or orange, dusky, irregular stripes or rings. Length 5 – 7 inches.

Description. Shell emarginate behind, depressed, but the extent of this depression varies in different individuals; occasionally quite elevated, and as if distinctly carinated along the vertebral plates. Each plate is very distinctly marked, particularly in the males, by five to seven or eight regularly concentric lines, parallel with the direction of the sides of the plate: varieties occur, in which the plates are nearly smooth. The first vertebral plate quadrate, the remainder six sided; the last polygonal, the anterior margins forming nearly a curved line. Lateral plates, the three first pentagonal; the last small, subquadrate. Marginal plates twenty-five, unequal in size; the intermediate small, oblong, linear, the outer edge occasionally emarginate, sometimes triangular, truncate; the posterior plates small, somewhat upturned. Sternum of six pair; the gular plates small, triangular, with impressed concentric angular lines; the next pair larger, subquadrate, enlarged on the outer margin; the three following subequal, the caudal pair rounded behind, where they form a broad emargination. Extremities with separate scales.

Color. Usually of a dull ash brown above, varying in intensity in different individuals, sometimes approaching to black. Beneath, reddish or orange, occasionally pale and dull yellowish, with dusky dashes and rings on the sternal plates and lower side of the marginal plates. Head, neck and extremities dull bluish ash, with numerous spots of black.

Length,	5·0 – 7·0.
Height,	1·0 – 2·5.

This species is the well known and justly prized Terrapin of epicures. It is well distinguished as the Salt-water Terrapin, for it is found exclusively in salt or brackish streams near the seashore. They bury themselves in the mud during the winter, from which they are taken in great numbers, and are then very fat.

The geographical limits of this species extend from the Gulf of Mexico, along the Atlantic, to New-York. They are found along the northern shores of Long Island to its extremity, but I am not informed whether it occurs on the opposite main shore. Dr. Storer does not mention it in his valuable Report on the Reptiles of Massachusetts. The Prince of Canino has introduced this species into Italy, but I have not learned with what success.

THE SMOOTH TERRAPIN.

EMYS TERRAPIN.

PLATE XXIII. FIG. 63. — FIG. 65. POSTERIOR VERTEBRAL PLATE. — (STATE COLLECTION.)

Testudo terrapin. SCHŒPFF, Hist. Testud. p. 64, pl. 15.
La Tortue à lignes concentriques, variété 3me. DAUD. Hist. Rept. Vol. 2, p. 157.
Emys concentrica. GRAY, Synopsis apud Griff. p. 11.
Emys terrapin. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 13, pl. 2, (excl. syn.) Ed. 1ma; Vol. 1, p. 87, pl. 12, Ed. 2da.

Characteristics. Shell smooth, not sculptured with concentric marks; posterior vertebral plate regularly pentagonal. Length 5·0 – 7·0.

Description. In the skull, the occipital process is more slender and longer than in the preceding. No striking differences are observable in the shell, except that it is never so much carinated as in the preceding species, and it has only a few concentric striæ on the lateral plates; the last vertebral plate distinctly pentagonal.

Color. Shell grey, with black concentric marks on each plate. Skin grey, speckled, and spotted with black.

I am indebted to Major Le Conte for a figure and note, pointing out the distinctive marks between this and the preceding species, which had been confounded by Daudin, and not contradistinguished by subsequent observers. They are both brought to our markets at the same time, and sold under the common name of *terrapin*. The specimens of the two species of the same size, examined by Major Le Conte, were both females. I had noticed the two, and supposed them to be sexual varieties. The market people say that they are caught in the same localities; but as Schœpff derived his specimens (the present species) from Muhlenberg, I am inclined to believe that the T. terrapin inhabits indifferently fresh and salt water. Schœpff himself found one on Long Island, in water which was almost fresh.

The figure and description of the *Emys terrapin* of my friend Dr. Holbrook, clearly point out this species. His specimens are obscurely carinate on the vertebral line, and he is entirely silent respecting the deep concentric marks which distinguish the other species. According to Holbrook, this species occurs as far east as Rhode-Island.

THE PAINTED TORTOISE.

EMYS PICTA.

PLATE V. FIG. 10. — (STATE COLLECTION.)

Testudo picta. GM. SCHNEID. Schildkrof. p. 348.
T. id. SCHŒPFF, Hist. Test. p. 23, pl. 4. (Adult.)
T. cinerea. ID. pl. 3. fig. 3. (Young.)
Tortue peinté. DAUD. Hist. Rept. Vol. 2, p. 164.
E. picta. SAY, Ac. Sc. Vol. 4, p. 211. LE CONTE, Ann. Lyc. Vol. 3, p. 115.
E. id. HARLAN, Med. & Phys. p. 151.
E. bellii. GRAY, Synops. p. 12.
E. picta et *bellii.* DUMER. & BIB. Hist. Rep. Vol. 2, p. 297 and 302.
E. picta. HOLBROOK, N. Am. Herp. Vol. 2, p. 19, pl. 3. STORER, Mass. Rep. p. 208.
E. id. ID. N. Am. Herp. Ed. 2da, Vol. 1, p. 75, pl. 10.

Characteristics. Shell oblong, oval, smooth; olive, with a yellow stripe along the sutures. Head with yellow lines along the sides. Neck and feet with red stripes. Length 5 – 9 inches.

Description. Shell oblong, oval, not carinated, smooth, minutely notched behind. First vertebral plate with projecting acute lateral angles in front, rounded or sinuous behind; the two following irregularly quadrate; the third having a small projection forward on its anterior margin; the fourth hexagonal, with sinuous sides; the last obscurely hexagonal. Of the lateral plates, the first is irregularly four-sided, the margin contiguous to the second vertebral plate shortest; the second is by far the largest, and the posterior smallest. The intermediate marginal plate linear, often doubly notched or bidentate in front; the first and second pair, together with the eighth and ninth on each side, largest. Sternum solid, elliptical, oval, finely serrate in front, the medial line often irregular; scapular plates triangular, with a slight knob-like process at the exterior angles, which project beyond the margin; pectoral plates narrow. Head moderate; upper jaw notched, with a slight process on each side of the emargination. Feet palmate, with five slender, acute and nearly straight claws in front, and four behind. Tail short, scaly, cylindrical. Independent of the sutures indicated externally on the shell by the markings, there are others concealed by the scaly epidermis.

Color. This varies exceedingly in different individuals, but the following is the most usual distribution: Shell olive brown or blackish, with irregularly dilated yellow lines, bordered with black along the suture. A very narrow yellow dorsal line from the margin of the intermediate plate, to the space between the two posterior marginal plates. The upper surfaces of the marginal plates with parallel vertical yellow lines, or else with concentric lines of the same color; occasionally these lines become abbreviated, disconnected, and sometimes small orbicular yellow or reddish spots margined with black; the under side of these plates yellow or reddish, with rounded or sub-quadrate dark spots. Sternum yellow or deep orange; all the plates towards the medial line with irregular concentric approximated dusky lines; these lines becoming occasionally confluent, and extending irregularly along the sutures toward the

outer margins, form a dark blotch, with a few lighter spots within. Neck, feet and tail black, more or less distinctly striped with red intermixed with yellowish. Sides of the head striped with yellow, and with four yellow blotches above. Eyes small; pupil black, with golden irides, and a black stripe running horizontally through their centres.

Total length, ... 5·0 – 6·5.
Height, ... 2·0.

For the variety and beauty of its markings, this is unquestionably the handsomest of our fresh-water species. It is a timid, inoffensive animal, and dies in a few days when kept out of the water. It feeds on insects and the smaller aquatic reptiles, and also eats the leaves of the Alisma plantago, or water plantain. It is found in every part of the State, and next to the *guttata* or Spotted Tortoise, is the most common, preferring tranquil ponds of water to clear running streams. Although occasionally eaten, it is not much esteemed. It ranges from Canada to Georgia along the coast, and has been observed near Lake Superior. It is enumerated by Kirtland among the Reptiles of Ohio.

THE SPOTTED TORTOISE.

EMYS GUTTATA.

PLATE VI. FIG. 12.—(STATE COLLECTION.)

Testudo guttata. SCHNEID. Naturforsch. Vol. 4, p. 264.
T. punctata. SCHŒPFF, p. 25, pl. 5.
T. punctata. LE CONTE, Ann. Lyc. Vol. 3, p. 117. SAY, Ac. Sc. Vol. 4, p. 212. HARLAN, Med. and Phys. p. 151.
Clemys punctata. WAGLER, Nat. Syst. der Amph. p. 137.
Emys guttata. HOLBROOK, N. Am. Herp. Vol. 2, p. 25, pl. 4; Vol. 1, p. 81, pl. 11, Ed. 2da.
E. guttata. DUM. & BIB. Hist. Rep. Vol. 2, p. 295. STORER, Mass. Rep. Vol. 1, p. 295.

Characteristics. Black, with rounded distant dots above; varied with black and yellow beneath. Length 3 – 4 inches.

Description. Shell ovate, (in the young, narrowed before, and widely emarginate in front;) slightly emarginate behind; higher behind than in front. First vertebral plate pentagonal, the following hexagonal, the last seven-sided, all subequal. Of the four lateral plates on each side, the anterior is irregularly quadrate, the others pentagonal. Marginal plates twenty-five; the anterior impair, small, linear; (in the young, broader;) the others sub-quadrate; the fourth, fifth, sixth and seventh on each side smallest, and more vertical. The sutures are accompanied with deep concentric furrows, which in the adult become nearly or completely effaced. Sternum emarginate behind; the anterior pair triangular, with the external angle projecting beyond the margin; the next pair irregularly triangular, and larger; the two following pair oblong; the femoral pair enlarged on their outer margins; caudal pair trapezoidal. The junction of the sternum with the shell occurs with the fourth to the seventh marginal pair inclusive. All the sternal plates have angular concentric lines near the sutures. Head mode-

rate, depressed above; upper jaw emarginate. Legs scaly. Fore feet with five slightly incurved, brownish or black claws, channelled beneath. Of the four hind claws, the one next to the interior is longest. Tail pyramidal, pointed, with a slight prominence along the dorsal line.

Young. The plates of the sternum and shell with deeply impressed concentric angular lines, covering each plate. Upper surface, when moistened, deep shining black; the yellow dots confined to the marginal plates, of which there is one on each. Sternum and under sides of the marginal plates rosaceous, or flesh-colored.

Color. Black or deep brownish black, with distant rounded yellow dots, occasionally with a few orange spots. Head with two or more reddish spots above. Chin and neck dark brown, with irregular reddish spots. Feet dark-colored, reddish within. Sternum yellow horn-color, with dusky brown nearly covering each plate. Marginal plates yellowish beneath. Tail black above, reddish about the region of the vent.

Length of the shell, ...	4·0 – 5·0.
Ditto of the tail, ...	1·0 – 1·3.

This is one of our most common tortoises, and offers great varieties in the distribution of its spots. Most generally the lateral plates have but a single spot on each. They vary also exceedingly in the convexity of the shell. Under the name of *Speckled Turtle*, this little animal is found throughout the Union. It inhabits streams and ponds, giving a preference to such as have a deep muddy bottom. On a warm day, they may be seen on a log or rock, closely huddled together, and basking in the sun; from this they slip suddenly into the water, on the approach of man. They feed on insects, frogs and worms; and bury themselves, on the approach of winter, in the mud at the bottom of ponds. It is rare in the Western States.

THE WOOD TERRAPIN.

EMYS INSCULPTA.

PLATE IV. FIG. 8. — (CABINET OF THE LYCEUM.)

Emys scabra. SAY, Acad. Nat. Sc. Philad. Vol. 4, p. 210.
Terrapena scabra. BONAP. Oss. p. 157.
Testudo insculpta. LE CONTE, Ann. Lyc. N. Y. Vol. 3, p. 112. HARLAN, Med. and Phys. p. 152.
Emys pulchella. DUM. and BIBR. Hist. Nat. des Rept. Vol. 2, p. 251.
Wood Tortoise. STORER, Mass. Report, p. 209.
E. insculpta. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 17, pl. 2; and Vol. 1, p. 87, pl. 13 of 2nd Ed.

Characteristics. Shell carinate, deeply furrowed by concentric and radiating lines. Plates of the sternum black at the angle formed by their exterior and posterior angles; emarginate behind. Length 8 – 10 inches.

Description. Shell oval, emarginate behind, depressed on the back, with a distinct carina, more prominent on the anterior and posterior vertebral plate. The surface of all the plates

deeply sculptured by radiating and concentric lines, the latter somewhat waved, which gives to the whole surface a minutely reticulated aspect. The first vertebral plate pentagonal, smooth on the centre of its posterior margin; the others sub-pentagonal. The first lateral plate four-sided, the internal margin short; the centre of the posterior margin of the last occasionally elevated. Marginal plates twenty-five; the intermediate one linear, prominent, often projecting; the next obscurely pentagonal, projecting at the external angle, the second dilated along the outer margin. The outer edges of the fourth, fifth, sixth and seventh plates slightly upturned; the largest are the ninth, tenth and eleventh, with their posterior angles slightly projecting. Sternum of twelve plates widely and deeply notched behind, depressed in the centre, and with obsolete angular concentric striæ on the sides towards the medial line. Scapular plates with a slight acute tip at the outer angles, projecting a little beyond the margin, as does likewise the femoral beyond the caudal; the humeral and abdominal plates united to the marginal, without any intermediate plates. Head moderate, flattened above; upper jaw emarginate, robust, the lower hooked. Neck rather long. Legs robust, scaly; feet palmate, the anterior with five and the posterior with four very stout claws. Tail short, large at the base, cylindrical, scaly, tapering, sub-compressed to an acute tip.

Color, of the whole shell, brown, tinged with reddish, and with radiating, abbreviated yellow lines; edges of the marginal plates horn-color. Sternum and under side, the marginal plates yellow, with black blotches near their posterior and lateral margins. Under portions of the neck, feet and tail, red, speckled with black; often a yellow line on each side of the neck. Eyes with a black pupil and brown irides, surrounded by a yellow ring.

Total length, ...	11·0.	Length of the tail, ...	1·6.
Length of the shell, .	6·5.	Height of the shell, ..	2·7.

This is not one of the largest dimensions. Mr. Say speaks of one of which the shell was nine inches long, and I have heard of another which measured twelve inches.

We are indebted to Major Le Conte for the first elimination of this species. It is not so exclusively aquatic as most of its congeners, for it is frequently met with in woods at some distance from the water: hence one of its popular names. It is also called the *Fresh-water Terrapin*, to distinguish it from the *E. palustris* before described, and which it is thought to resemble in flavor. It is a northern species, extending from near Canada to Pennsylvania. I observed it along the banks of the Raquet and Saranac rivers, in the northern part of the State. In one specimen 8·0 long, the caudal plates were serrated on their posterior margin by the extension of the deep angular impressed lines; the lateral plates were hollowed in their centres; neck furnished with warts; color dark greenish, with interrupted radiating yellow lines; throat and lower side of the legs bright orange. In another, found on a sand beach of Cedar river, one of the sources of the Hudson, with a shell 8·5 long, it was more convex, although the vertebral plates were more depressed, and the keel nearly effaced; the sutures were wide, and the plates elevated at the sutures. It is a harmless species; but when irritated, it will snap repeatedly at the offender. Little is known of its habits.

THE RED-BELLIED TERRAPIN.

EMYS RUBRIVENTRIS.

PLATE VII. FIG. 14. — (STATE COLLECTION.)

Emys serrata. SAY, Acad. Nat. Sciences, Vol. 4, p. 208 (excl. syn.) HARLAN, Ac. Sc. Vol. 4, p. 204.
Testudo rubriventris. LE CONTE, Ann. Lyc. Nat. Hist. Vol. 3, p. 101. HARLAN, Med. and Phys. Res. p. 154.
E. irrigata. BELL, Gray's Synops. Rept. p. 29.
E. id. DUMERIL et BIB. Hist. Nat. Rep. Vol. 2, p. 276.
E. rubriventris. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 37, pl. 6; and Vol. 1, p. 55, pl. 6, of Ed. 2da.

Characteristics. Very large. Shell oblong, gibbous, ecarinate. Intermediate plate linear, often serrate. Shell wrinkled along the side. Jaws serrated. Beneath red. Length 10 – 17 inches.

Description. Shell oblong, elliptical, restricted, opposite to the abdominal plates, emarginate behind; the sides with longitudinal wrinkles, which extend over the posterior marginal plates. The first vertebral plate obscurely six-sided, shorter than the others; the three following, oblong, the anterior margin of the first of these concave, the next nearly straight, the succeeding one convex, the lateral angles of all acutely pointed; the posterior plate narrow in front, its lateral margins wide, its posterior margins subdivided into four concave surfaces. The lateral plates very large; the posterior plate smallest, quadrate. Marginal plates twenty-five; the intermediate often serrate, the next slightly projecting; the eighth, ninth, tenth and eleventh also projecting at their external posterior angles. Sternum smooth, of twelve plates, emarginate behind. Scapular plates projecting; occasionally a small supplementary plate between the external angle of this and the following pair. Pectorals narrow, and united to the third, fourth and fifth marginal plate by an accessory plate. Abdominal pair large, and united by a triangular accessory plate at its posterior margin, to the seventh and eighth marginal pairs. Femoral plates project beyond the succeeding pair. Posterior angles of the caudal pair rounded. Upper jaw emarginate, and receiving the middle tooth of the under jaw. Legs and tail scaly, the former with robust claws.

Color. Dusky, with reddish confluent spots, and broad reddish lines. Sternum often of a uniform lake red; the under side of the marginal plates of the same color, with large dusky splashes or spots. Head dark brown or black, and with the throat striped with reddish or yellow. Eyes yellow, with a horizontal broad and black stripe through the middle. Legs and tail dusky, spotted, and occasionally striped with red.

This is one of the largest of the genus, and the neighborhood of the city of New-York appears to be its extreme northern limit. I have never seen it in the western parts of the State, and it appears to be unknown in Ohio. They are brought to our markets from New-Jersey, where they are very numerous in running streams. As an article of food, they are equally prized with the preceding. It is not found farther south than Virginia, and with its western limits I am unacquainted. It may be well to note, that in cabinet specimens, its rich coloring almost entirely disappears, and the brilliant red sternum is changed to a wax yellow. Its history is yet incomplete.

MUHLENBERG'S TORTOISE.

EMYS MUHLENBERGII.

PLATE VIII. FIG. 15.—(STATE COLLECTION.)

Testudo punctata, var. SCHŒPFF, Hist. Testud. p. 132, pl. 31.
Chersine muhlenbergii. MERREM, Syst. p. 30.
Clemmys? WAGLER, p. 136.
Emys biguttata. SAY, Acad. Nat. Sc. Vol. 4, p. 205.
Terrapene. BONAP.
T. muhlenbergii. LE CONTE, Ann. Lyc. Nat. Hist. Vol. 3, p. 119.
E. id. HARLAN, Medical and Physical Researches, p. 152.
E. id. HOLBROOK, N. Am. Herpetology, Vol. 1, pl. 5; and Vol. 1, p. 45, pl. 4, of Ed. 2da.

Characteristics. Shell elevated, carinate. Neck with one or more orange spots on the side. Length 4 inches.

Description. Head moderate, depressed above; upper jaw deeply notched, the lower with an acute tip. Membrane of the neck rugose, with unequal papillæ and a large fold. Fore feet scaly; the five toes divided from the claws nearly to their bases. Claws subequal, the external and internal being somewhat shorter. Hind legs longer than those before, with four toes, and one obsolete on the inner side. Tail sub-triangular, with about fourteen pair of sub-caudal plates. Shell elevated, carinate, dilated behind, narrowed in the middle; anterior margin scolloped, the posterior emarginate. The intermediate marginal plate sub-linear and very small, projecting slightly beyond its neighbors; the four next on each side nearly horizontal; the three following more vertical, and the remainder horizontal, the most posterior declivous. First vertebral plate pentagonal, the three next hexagonal, the fifth irregularly four-sided, the remainder pentagonal. All the scales with concentric angular striæ and corresponding ridges, except on the middle marginal plates, where they become almost obsolete; in old individuals, they become partially or entirely obliterated. Sternum emarginate behind. Scapular plates triangular, with their external angles projecting and rounded within, as shown on the plate above referred to. The remaining plates sub-quadrate; abdominal largest; femoral with its posterior angle projecting beyond the caudal, which is rhomboidal; all have concentric striæ.

Color. Head dark-colored above, with darker dashes and crimson dots on the cheeks. Irides brown. Chin and sides of the jaw with bright red streaks and spots. Two large irregular orange or yellow spots, often confluent, on each side of the back part of the head. Inside of the feet and under side of the tail, red; this is also the predominant color of the exterior parts, but it is of a darker hue. Shell dark brown, with irregular sub-radiating lines of a dingy yellow. Sternum blackish, with yellow or flesh-color along the medial line. Claws of a dark horn-color.

Length of shell,	3·5.
Height,	1·8.
Length of the head and neck from the intermediate plate,	1·4.

It is with hesitation that I refer this rare species to the present genus. It is decidedly terrestrial in its habits; preferring, however, moist places, and the neighborhood of running streams. The foregoing description was made from a living specimen presented to me by Mr. J. W. Hill, who obtained two of them from a meadow near Clarkstown, Rockland county, in the early part of May. Their movements, unlike most of the genus, are very sluggish; and in captivity, they attempt to burrow. Its hitherto known geographic range is very restricted, being limited to New-Jersey and the eastern part of Pennsylvania: it may now be extended to the State of New-York.

THE GEOGRAPHIC TORTOISE.

EMYS GEOGRAPHICA.

PLATE IV. FIG. 7. — (STATE COLLECTION.)

Testudo geographica et *geometrica*. LES. Mem. Mus. Vol. 15, p. 267.
Testudo geographica. ID. Acad. Nat. Sc. Philad. Vol. 1, p. 87, fig. 5.
Testudo id. LE CONTE, Ann. Lyc. Vol. 3, p. 108. HARLAN, Med. and Phys. Res. p. 152.
Testudo id. HOLBROOK, N. Am. Herp. Vol. 4; and Vol. 1, p. 99, pl. 14 of Ed. 2da.

Characteristics. Head very large. Shell not elevated, smooth, ecarinate, serrated behind, with irregular meandering yellow lines. Feet and tail striped with yellow. Head with yellow stripes, but no spots. Length six inches.

Description. Shell oval, smooth, widely emarginate in front, more narrowly notched behind. The vertebral plates scarcely approach a carinate form: The first, hexagonal, rounded in front, with a slight central elevation continued along the intermediate marginal plate; the three following larger, subequal, hexagonal. The two intermediate lateral plates largest, pentagonal; the posterior rhomboidal. Marginal plates twenty-five; the three first on each side continuous with the direction of the vertebral and lateral plates; the three following restricted, with their outer margins turned upwards; the seventh and eighth largest; the four remaining ones on each side two-toothed on the outer margins, the bidentation becoming gradually more distinct to the last. Sternum deeply notched behind; the scapular plates small, triangular, with a small projection at the outer angle, directed forward; brachial plates, triangular; femoral and caudal pair subquadrate. Head large, more than twice the size of the succeeding species; jaws acute. Legs rather long, scaly; feet palmate, well adapted for swimming. A series of rather large flat scales on the upper margin of the fore legs, which are furnished with five long, sharp, incurved claws. A broad palmation on the hind feet, posterior to the outer claw, margined with flat scales. Tail short, pointed, cylindrical at the base, compressed towards the tip.

Color. Shell olive brown, with paler narrow meandering lines intersecting each other. Marginal plates beneath, and the processes of the pectoral and abdominal plates, yellowish, with broad, brownish, concentric striæ. Sternum yellowish, with brownish variegations. Upper part of the head, feet and tail, brownish black. Head and neck striped with yellow,

occasionally with orange or red; these stripes are irregular, waved, confluent. Chin and throat dusky, with irregular yellowish longitudinal lines in a double series. The under sides of the legs yellowish, with similar duplicated lines above, dusky with narrow yellow stripes. Tail with narrow yellow longitudinal stripes. Eyes yellow, with a horizontal black stripe.

Total length,	10·5.	Height of shell,	3·0.
Ditto of shell,	6·5.	Breadth,	5·0.
Ditto of tail,	1·3.		

This species, which is not uncommon in the counties of Chautauque and Erie, in the streams falling into the great lake, is more abundant in the western waters. I have never tasted their flesh, but am assured that it is very palatable. They are exceedingly active and vigorous. Until recently separated by Dr. Holbrook, two species have been confounded under one name.

THE PSEUDO-GEOGRAPHIC TORTOISE.

EMYS PSEUDOGEOGRAPHICA.

PLATE II. FIG. 3.—(CABINET OF THE LYCEUM.)

Testudo geographica, Var. b. LES. Mem. Mus. Vol. 15, p. 268.
Emys geographica. SAY, Acad. Nat. Sc. Philad. Vol. 4, p. 210.
Emys id. Var. a. LE CONTE, Ann. Lyc. Nat. Hist. N. Y. Vol. 3, p. 110.
E. lesueuri? GRAY, Synop. Rept. p. 12, apud Griffith.
Emys pseudogeographica. HOLBROOK, N. Am. Herp. Vol. 1, p. 103, pl. 15.

Characteristics. Shell elevated, carinate. Head moderate, with yellow stripes and large confluent blotches. Size of the preceding.

Description. Shell much more elevated than in the preceding species. First vertebral plate smallest, elevated in the middle, somewhat pentagonal; the following three six-sided, and the last three-sided. A prominent dark-colored tubercle on the central line of the posterior vertebral plate, projecting backwards, and almost imbricated over the next succeeding plate; these tubercles are largest on the second and third plates, becoming effaced on the last. The other plates of the shell present nothing distinctive. Sternum oblong, elliptic, of six pair, and widely emarginate behind: The anterior or scapular pair small, triangular, with a small tubercular process at the outer angle; brachial plates truncate, triangular; abdominal plates largest, and united by lateral processes and an intermediate plate to the fifth, sixth and seventh marginal plates; femoral plates four-sided, the posterior angle projecting beyond the lateral margins of the caudal pair.

Color. Very much like the preceding, both in its general color and the distribution of its markings. Edge of the marginal plates yellow. Sternum of a uniform yellowish color. Head with numerous yellow lines, frequently forming one or more large rounded spots on the sides of the head.

Length, 5·0 – 7·0.

I have never met with this species in this State, but am assured by Major Le Conte that he has seen it in Lake Erie, from which it is reasonable to suppose that it occurs in this State. The specimen affording the above description, was one sent to the Lyceum by Mr. Schoolcraft, from the Sault St. Marie, several years ago.

(*EXTRA-LIMITAL.*)

E. floridana. (Holbrook, Vol. 2, p. 47, pl. 8; and Vol. 1, pl. 8 of 2d Ed.) Shell gibbous, entire, ecarinate, very large, roughened longitudinally. Brown, with numerous dashes of dusky. Length of shell 15 inches. *Florida.*

E. reticulata. (Holbrook, Vol. 2, pl. 7; and Vol. 1, pl. 7 of 2d Ed.) Gibbous, ecarinate, entire, rugose longitudinally. Dark brown yellow lines, and a dorsal yellow line; neck very long; feet striped with yellow. Length of shell 9 inches. *Carolina, Georgia.*

E. serrata. (Id. Vol. 2, pl. 5; and Vol. 1, pl. 7 of 2d Ed.) Gibbous, carinate, almost round, longitudinally rugose. Dusky, with irregular yellowish lines; a large yellow spot on the cheek. The five posterior marginal plates deeply serrate behind. Length 12 inches. *Virginia, Georgia.*

E. concinna. (Id. Vol. 1, pl. 19.) Smooth, ecarinate, emarginate behind. Dusky brown, with confluent yellow spots and lines, more or less reticulated; legs and neck striped with yellow; a bifurcate stripe on the sides of the head. Length 8 inches. *Georgia, Carolina.*

E. mobilensis. (Id. Vol. 2, pl. 9; and Vol. 1, pl. 9 of 2d Ed.) Large, oval, convex and entire in front, emarginate and sub-serrate behind. Jaws serrate; inferior with a hook. Brown, with largely reticulated yellow lines. Shell 15 inches. *Alabama.*

E. oregonensis. (Harlan, Am. Jour. Vol. 31, pl. 31. Holbrook, Vol. 1, pl. 16.) Shell ecarinate, olive, with irregular bright yellow lines margined with black; anterior marginal plates serrated in front. Length 8 inches. *Columbia River.*

E. hieroglyphica. (Holbrook, Vol. 1, pl. 2; pl. 17 of Ed. 2.) Shell ecarinate, smooth, elongate and imperfectly serrate behind. Sternum emarginate behind. Upper jaw slightly notched; lower with a tooth. Shell dusky, with broad sub-concentric yellow lines. Claws very long. Length 12 inches. *Tennessee.*

E. megacephala. (Id. Vol. 1, pl. 3.) Shell carinate, serrate and acute behind. Sternum oblong, emarginate. Head very large; jaws entire. Shell dark olive green; sternum dingy yellow; head and neck with greenish yellow stripes. Length 8 inches. *Tennessee, Ohio.*

E. troosti. (Id. Vol. 1, pl. 4; Vol. 1, pl. 20 of Ed. 2.) Shell depressed, ecarinate, slightly serrate behind. Head long and narrow. Upper jaw notched; lower jaw with a toothlike process. Shell dark green; sternum yellow, with a large black blotch near the centre of each plate. Length 8 inches. *Tennessee.*

E. cumberlandensis. (Id. Vol. 1, pl. 18.) Head moderate; upper jaw slightly emarginate; lower with a small hook in front. Shell rather rounded, indistinctly carinate, slightly notched in front, and serrated behind. Shell brown, with radiating yellow lines. Length of shell 8 inches. *Tennessee.*

GENUS KINOSTERNON. *Spix.*

Head sub-quadrangular, pyramidal, covered with a single plate. Jaws slightly hooked. Warts at the chin. Marginal plates twenty-three. Sternum subdivided into three sections; the anterior and posterior movable, the central fixed. Plates of the sternum eleven. Supplemental plates very large. Tail moderate or long.

THE MUD TORTOISE.

KINOSTERNON PENSYLVANICUM.

PLATE II. FIG. 4. — (CABINET OF THE LYCEUM.)

Testudo pensylvanica. EDWARDS, Gleanings, pl. 287. PENN. Arct. Zool. Suppl. p. 80.
La Tortue rougeâtre. DAUD. Vol. 2, p. 182, pl. 24, fig. 1, 2.
Cistuda pensylvanica. SAY, Ac. Sc. Vol. 4, p. 206. LE CONTE, Ann. Lyc. Vol. 3, p. 120.
Kinosternon id. BELL, Zoological Journal, Vol. 2, p. 304.
Emys id. HARLAN, Med. and Phys. Researches, p. 155.
Kinosternon pensylvanicum. HOLBROOK, N. Am. Herpet. Vol. 2, p. 23, pl. 3; and Vol. 1, p. 127, pl. 21 of 2d Ed.
Cinosternon. WAGL. Bonap. Chel. Tab. analytica, p. 7.

Characteristics. Dusky brown. Shell vaulted. Upper and lower jaw hooked. The penultimate marginal plate on each side, dilated. Tail with a horny point. Length four inches.

Description. Shell oval, smooth, elevated behind, flattened above, descending rapidly behind, where it is minutely emarginate; the surface is covered with numerous obsolete angularly concentric furrows. First vertebral plate triangular, with a truncate apex behind; the second, third and fourth, hexagonal; the third smallest: all sub-imbricate behind. Lateral plates large, imbricate. Marginal plates elevated above the plane of the lateral plates, and separated from them by a deep furrow as far as the tenth pair, which, together with the eleventh, is continuous with the plane of the lateral and vertebral plates, and much higher than the others; the intermediate plate small, linear, dilated beneath. The sternum of eleven plates, somewhat concave, notched behind, with a joint at the pectoral plates, and another joint more or less obvious at the posterior margin of the abdominal plates. Gular plates united into one, triangular. Brachial plates obliquely four-sided; the thoracic triangular, smaller: both pair united to each other, and attached by a ligamentous hinge to the fixed abdominal pair, which is largest. This last pair connects to the marginal plates by two accessory plates, of which the posterior is largest, subtriangular. The posterior angle of the femoral plates forms a notch with the border of the caudal plates, which are emarginate. All the plates of the sternum with deeply sculptured angular and parallel lines. Head large. Upper and lower jaw with a hooked tooth. Skin of the neck with four series of cutaneous papillæ; two others larger, approximated beneath the chin. Fore feet naked, with two large scaly folds on the upper side, and small scales beneath, with five robust but short claws. A few scattering

tubercles on the under side of the leg. Hind legs with four claws; the fifth toe distinct, but clawless. Tail short, very robust at base, and terminating in a stout blunt horny point; the sides of the tail with from four to six series of short tubercular processes, which are likewise numerous around the vent.

Color. Shell olive brown. Sternum yellow or orange and darker, occasionally black in the vicinity of the sutures. Head brownish, with irregular lines, streaks and spots of a lighter color, which also extend to the sides of the neck. Irides dark brown. Feet and tail dusky brown; beneath lighter.

Total length,	6·0.	Length of the tail,	0·6.
Ditto of the shell,	4·0.	Height,	1·8.

New-Jersey has hitherto been considered as the highest eastern limit of this species; but it is (although sparingly) found in the southern counties of this State, west of the Hudson. I find no mention of it in Storer's Report on the Reptiles of Massachusetts, although it is cited in Hitchcock's Catalogue. It extends to Florida, and I presume through the Western States. It inhabits ditches and muddy ponds, and often takes the hook. It preys on fish and the smaller aquatic reptiles. Like the *odoratus*, it has a strong musky smell, and it cannot readily be confounded with any known species.

GENUS STERNOTHÆRUS. *Bell.*

Head sub-quadrangular, pyramidal in front, covered in front with a single plate. Warts on the chin. Twenty-three marginal plates. Sternum cruciform, bivalve, anterior valve only movable. Supplemental plates contiguous, placed on the sterno-costal suture.

THE MUSK TORTOISE.

STERNOTHÆRUS ODORATUS.

PLATE VII. FIG. 13.—(STATE COLLECTION.)

Testudo pensylvanica. SCHŒPFF, Hist. Test. p. 110.
T. odorante. LAT. Hist. Rep. Vol. 1, p. 122.
T. odorata. DAUDIN, Hist. Reptiles, Vol. 2, p. 189, pl. 24, fig. 3. (Sternum.)
Cistuda odorata. SAY, Ac. Sc. Nat. Vol. 4, p. 206 and 216.
Sternothærus. BELL, Zool. Jour. p. 209.
Kinosternon odorata. GRAY, Synops. apud Griffith, Vol. 9, p. 13.
Terrapene id. MERREM, Syst. Amphib. p. 27.
Testudo id. LE CONTE, Ann. Lyc. Vol. 3, p. 122.
Sternothærus id. HARLAN, Med. and Phys. p. 156.
Kinosternum id. BON. Oss. p. 169. Chelon. Tab. analyt.
Staurotypus id. DUM. et BIB. Vol. 2, p. 358.
Sternotherus id. STORER, Mass. Report, p. 210.
Sternothærus id. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 29, pl. 4; and Vol. 1, p. 133, pl. 22 of 2d Ed.

Characteristics. Very small. Shell gibbous, subcarinate; first vertebral plate pointed behind. Small, brownish, with darker radiating streaks on a dark olive green ground. A disagreeable odor. Length 3½ inches.

Description. Shell oblong, narrow in front, broader and more erected behind; the dorsal outline descends rather more abruptly behind; slightly carinated on the dorsal ridge. The first vertebral plate triangular, with its truncated axis behind; the three following hexagonal, the last smaller than the two preceding; the posterior plate sub-pentagonal, the posterior plates distinctly imbricated. Lateral plates large, the anterior irregularly subquadrate; the two following higher than broad, pentagonal; the last smallest, and also pentagonal; the intermediate marginal plate smallest, sub-quadrate; the remainder oblong, the four posterior largest; all, except the last two, separated from the shell by a groove. Sternum small, narrow, widely emarginate behind, composed of eleven plates, all with concentric angular striæ, and minute radiating striæ; the anterior intermediate or united; gular very small, triangular; brachial small; abdominal plates largest, and apparently immovable. Head and neck capable of protrusion an inch and a half from the shell. Head very large, pyramidal, four-sided, pointed, and slightly truncate in front. Eyes moderate. Nostrils large, contiguous, and placed at the extremity of the snout. Two short yellow fleshy tentacula under the chin, and two rather larger behind. Skin of the throat and neck granulate. All the feet with acute incurved claws, distinctly webbed; the place of the fifth claw on the posterior foot supplied by a broad web. The outer and inner margins of the feet furnished with a cuticular membrane, elevated into points. Scaly plates on the anterior surface of the fore feet, and on the under side of the hind feet. Tail very robust at the root, with several series of pointed processes, often with a horny tip.

Color. The color and markings of this species not easily detected in the recently caught animal, as it is usually covered with an agglutination of mud and aquatic plants; when cleansed, the shell appears of an olive brown or green, obscure, radiating dark stripes on the lateral plates, and similar longitudinal ones on the marginal plates. Sternum reddish brown or flesh-color, with a few indistinct dark blotches. Pupils black; iris golden. Head black or deep olive green. A yellow line on each side passes from the nostrils over the eye upon the neck; another somewhat broader, from beneath the nostrils, and meeting in front, passes backward under the eye upon the neck; a third, shorter, proceeds from near the symphysis of the chin, extending on each side of the lower jaw. Feet and tail reddish brown.

Length,	2·5.
Ditto of tail,	0·8.
Height,	1·2.

These dimensions are from a small specimen; the ordinary size is three inches: it is the smallest of our tortoises yet discovered. This species is one upon which modern systematists have expended much labor, the result of which may be seen in the list of synonimes.

The *Musk Tortoise* or *Mud Turtle*, *Mud Terrapin* or *Stink-pot*, (with other equally savory popular names,) is to be found in most of our ponds and ditches. It occurs from Maine to Florida, but its western limits are unknown. We know from Kirtland, that it occurs in the northern waters of Ohio. It appears to be an active, vigorous animal, biting with considerable vigor when irritated. There appears to be two varieties, of which one is smooth on the shell, while the other is sub-carinate.

GENUS CISTUDA. *Fleming.*

Shell gibbous, stout. Marginal plates twenty-four to twenty-five. Sternum oval, with twelve plates, bivalve; both valves movable on the same axis, and connected together by ligament. Anterior feet with five nails; posterior with four.

THE COMMON BOX TORTOISE.

CISTUDA CAROLINA.

PLATE I. FIG. 1. — (STATE COLLECTION.)

Testudo carolina. L. 12 Ed. p. 352.
T. claus. SCHŒPFF, Hist. Test. pl. 7.
Checkered Tortoise. PENN. Arct. Zool. Supp. p. 79.
T. clausa et *virgulata.* DAUD. Hist. Rept. Vol. 2, p. 207, pl. 23, fig. 1, 2.
Cistuda clausa. SAY, Ac. Sc. Vol. 2, p. 205.
C. carolina. LE CONTE, Ann. Lyc. Vol. 3, p. 124.
C. clausa. HARLAN, Med. & Phys. Res. p. 149.
C. carolina. DUM. & BIBRON, Vol. 2, p. 210.
C. id. STORER, Mass. Rep. HOLBROOK, Herpet. Vol. 3, p. 9, pl. 1; and Vol. 1, p. 31, pl. 2, of Ed. 2da.
C. clausa. KIRTLAND, Zool. Report of Ohio, p. 188.

Characteristics. Shell hemispherical, elevated. Upper jaw hooked. Vertebral plates sub-carinate. Sternum entire behind. Length 5 – 7 inches.

Description. Anterior vertebral plate carinate; the three middle vertebral plates hexagonal, sub-carinate; the fifth pentagonal, smallest. First lateral plate quadrilateral; the second largest. Marginal plates in this specimen, twenty-four; this is noticed by Merrem as unusual, but I have seen it in three or four specimens. The anterior marginal plate very small, linear. Sternum smooth, entire behind; the plates on the anterior lid smallest; scapular and brachial plates triangular; the others oblong, sub-quadrate. Posterior valve concave, not quite so flexible as the anterior, but sufficiently so as to enclose completely the animal. Fore feet with large and strong scales in front, and smaller ones behind, with short robust claws, of which the two medial were longest. Hind feet also with large scales, and four somewhat longer claws. Head stout, nostrils contiguous with the upper jaw, sometimes emarginate. Neck long. Tail short, conical.

Color. Shell with a dark brown ground, upon which are numerous irregular stellated marks and dashes, with occasional confluent blotches. Head, neck and extremities of a light lemon yellow, with irregular black stripes on the summit of the head. Sternum rosaceous, with broad irregular blotches of black.

Length of shell,	6·0.
Breadth,	4·0.
Height,	2·5.

This beautiful species, which is designated in this State under the names of *Box Tortoise* and *Land Turtle*, and in the west by the name of *Lock Tortoise*, is a very gentle and timid animal. It varies so much in its colors, that it is difficult to find any two alike. Major Le Conte has a series of drawings, exhibiting many remarkable varieties in color: One was of a uniform black; and from this to the brilliant colored individual figured in the plate, a regular transition could be traced. He has enumerated five varieties, but they are almost innumerable. In common with many observers, I had considered the angular and concentric striæ on the plates as constant characters. I have lately seen (May 1) a specimen, apparently of an adult, measuring six inches, in which the thin corneous laminæ covering the plates were gradually dropping off, or shed; leaving the new epidermis completely smooth beneath, with colors of renewed brilliancy, while the old laminæ were dull and strongly corrugated. How often does this desquamation occur? Is it the effect of disease, or is it an annual or periodical process? In this case, the desquamation was confined to the two middle dorsal, and to two lateral plates on one side, and to three on the other. The sutures between the plates, which had not desquamated, were of that deep character usually supposed to designate old age; but at the places where the desquamation had occurred, the sutures were as narrow and as little profound as in young individuals.

The Box Tortoise is common every where on dry land, although it is also occasionally met with in swamps and moist places. It never takes to the water from choice, and indeed would be drowned if retained there. It is frequently kept in cellars, under the notion that it drives away or destroys rats and other domestic vermin. One which I kept in my cellar, was found in the spring, eaten up by the rats. It feeds on insects, fruit, and the edible mushrooms. Its geographical range appears to be from Canada to Florida. It is rare in Ohio. In this latitude, it usually goes into winter quarters in the latter part of September.

BLANDING'S BOX TORTOISE.

CISTUDA BLANDINGII.

PLATE I. FIG. 2.

Cistuda blandingii. HOLBROOK, N. Am. Herpetol. Vol. 3, p. 34, pl. 5; and Vol. 1. pl. 39, pl. 3 of 2d Ed.
Blanding's Cistuda. STORER, Massachusetts Report, p. 215.

Characteristics. Shell less elevated than the preceding, ecarinate; margin entire. Sternum emarginate behind. Lower jaw hooked. Length 7 – 8 inches.

Description. Shell smooth, ecarinate. The first vertebral plate pentagonal; the second and third, hexagonal; the fourth with seven sides, the last octagonal. Anterior and posterior lateral plates four-sided, rounded beneath; the second and third, pentagonal. Marginal plates twenty-five, with an interrupted margin; the intermediate small; the first, third, fourth, sixth, eighth, tenth and twelfth plates quadrilateral; the second, fifth, seventh and ninth, pentagonal: all are smooth in their centres, with indistinct concentric striæ near their borders. Ster-

num bivalve, of twelve plates, full and rounded in front, deeply emarginate behind, and when closed entirely conceal the animal. Head moderate. Nostrils anterior, contiguous. Eyes large, prominent. Upper jaw broad, with its cutting edge sharp, and deeply emarginate in front. Lower jaw with a small hook. Neck long, and slightly contracted behind the head. Fore legs robust, with imbricated scales in front, and smaller ones behind. Toes palmated, with five short curved claws. Hind legs covered with small scales and granulations, and furnished with five palmated toes, the posterior clawless.

Color. Shell jet black, marked with numerous oblong and round yellow spots. Sternum dusky yellow; each plate with a large quadrangular dark blotch at its outer posterior angle. Head black, with oblong yellow spots. Lower jaw and chin bright yellow. Throat yellow, but clouded with dusky. Fore legs olive yellow in front; dusky, with yellow spots behind. Hind legs dusky above, and soiled yellowish behind. Tail black above, with two obscure yellowish lines; dusky beneath.

Length of shell, 7·0 – 8·0.

This species, which has been hitherto doubtless taken for a mere variety of the *C. carolina*, was first accurately described and figured by Dr. Holbrook in the work cited above. It was obtained by him from the prairies of Illinois and Wisconsin, and for some time this was the only locality. More recently it has been detected by Dr. Storer as far north as Haverhill, New-Hampshire, in 44° north latitude. It ranges unquestionably through all the northern and middle States; and hence, although not yet actually observed, must necessarily be included in our list of the Reptiles of New-York.

(*EXTRA-LIMITAL.*)

Genus TESTUDO, *Brongniart.* Shell solid. Sternum solid, immovable. Extremities short, thick and clavate. Toes short, and closely connected as far as the nails.

T. carolina. (HOLBROOK, Herp. pl. 1.) Shell very convex, depressed above; the last two marginal plates united; scapular plates projecting forward in a spade-like process. Tail very short. Length 12 inches. *Georgia, Florida.*

ORDER II. SAURIA.

Body long, cylindrical, covered with scales varying in size, or with small scaly granulations. Extremities four. Tail usually very long, thick at the base. Mouth not capable of dilatation, armed with teeth. Oviparous. Carnivorous.

This order comprises about three hundred species, but as they are for the most part inhabitants of the torrid zone, we have but twelve living and four fossil species in the United States. The State of New-York has but two living representatives of this order.

(*EXTRA-LIMITAL.*)

FAMILY EMYSAURIDÆ.

Body lizard-shaped, large. Body furnished with large bony plates, often carinated, and forming two elevated crests on the tail. Sides of the body with small scales; beneath square, slender, smooth. Feet palmate. Head large, often elongated. Fluviatile. Carnivorous.

This family corresponds with the order *Loricata* of Merrem and Fitzinger, and *Emydosaurus* of Blainville. It appears to be a link connecting the *Chelonidæ* with the order *Sauria:* it contains many extinct species.

Genus ALLIGATOR, *Cuvier.* Nostrils separated by a bony partition; forehead divided by a short prominent carina. Four large tubercles on the neck, arranged in rows on each side of the vertebral line. Muzzle elongated, broad and obtuse. Teeth unequal. Feet semipalmated, and without indentation.

A. mississippiensis. (Am. Tr. N. S. Vol. 2, p. 216. HOLBROOK, Vol. 2, pl. 7.) Dark ash brown above; lighter beneath. Four carinate plates on the neck, disposed in a square.

Genus CROCODILUS, *Cuvier.* Muzzle oblong, depressed. Teeth unequal; the fourth passing into grooves, and not into notches, in the upper jaw. Feet palmated.

We have no living representative of this genus in the United States. Dr. Harlan has described and figured, in the Journal of the Academy of Natural Sciences, Vol. 4, p. 15, pl. 1, a fossil species from the greensand of New-Jersey.

C. macrorhyncus. Jaw excessively thick. Teeth thick, short and blunt.

Genus GAVIALIS, *Cuvier.* Head produced into an elongated snout. Teeth subequal, the fourth passing into grooves, and not into holes, in the upper jaw. Hind feet palmated to the end of the toe, and indented at the external edge. Two large holes in the cranium behind the eyes, which may be perceived through the skin.

This group has no living representative in the United States. I have described, in the Annals of the Lyceum, Vol. 3, a portion of a fossil species from New-Jersey.

G. neocesariensis. (Plate 22, fig. 59.) With from fifteen to eighteen distant, conical teeth. Length 9 – 10 feet.

Genus MOSASAURUS, *Conybeare.* Teeth smooth, with two sharp crests, elevated from the jaw by an osseous support, pyramidal, slightly recurved, 12 – 15 on each side above and below.

This genus was first indicated by Cuvier, and the name imposed by Conybeare on a huge fossil aquatic reptile, long known in the books under the name of "the Animal of Mæstricht." It was treated by various naturalists as a crocodile, a fish, or as a cetaceous animal. In this country, I am acquainted with but two localities of this fossil genus. Consult MITCHILL, N. Y. Ed. of Cuvier's Theory of the Earth; HARLAN, Ac. Sc. Vol. 4, p. 235, pl. 14; DE KAY, Ann. Lyc. Vol. 3, p. 135.

M. major. (Plate 22, figs. 57, 58.) Closely allied to the typical species. 14 – 15 feet long. *New-Jersey, Alabama.*

Genus GEOSAURUS, *Cuvier.* Teeth resembling the preceding in their system of dentition, but compressed, and divided by sharp indistinctly serrated edges into two surfaces, each of which are subdivided into 4 – 5 facets.

This group of large fossil reptiles has also a representative in this country. It is from the greensand of New-Jersey, and fragments of its remains have been described and figured by me, in the Annals of the Lyceum, Vol. 3, p. 138.

G. mitchilli. (Plate 22, fig. 59.) Fifteen to twenty feet long.

FAMILY IGUANIDÆ.

Small. Tongue short and thick. Teeth in the palate. Scales on the abdomen not imbricated. Tail long and slender.

Genus ANOLIUS, *Cuvier.* Head elongated. Jaws and palate with small sharp notched teeth. Tongue soft, fleshy, neither cleft nor extensile. Body with minute scales. Tail cylindrical, very long, verticillate. Skin on the penultimate joints of the fingers and toes extending into an oval disk, transversely striate.

A. carolinensis. (HOLBROOK, Vol. 2, pl. 8.) Head flattened, and covered with minute scales; nostrils distant from the end of the snout; a dilatable sac under the throat. Tail nearly twice the length of the body. Length 6 – 8 inches.

FAMILY SCINCIDÆ.

All the scales on the body and tail smooth, shining, equal, imbricated. Feet two to four, and with the toes very short, sometimes rudimentary. Tongue scarcely retractile. No gular pouch.

OBS. Of this family, we know at present four living species in the United States, one of which extends to our State, and even farther east.

GENUS SCINCUS. *Daudin.*

Head oblong, pointed, covered with plates. Jaws furnished with closely set teeth; two rows of teeth on the palate. Tongue fleshy, slightly extensible, emarginate. Tympanum apparent. Neck as large as the head. Body elongated. Tail conical. Body and tail covered with small imbricated scales. Extremities with free and nailed claws.

THE BLUE-TAILED SKINK.

SCINCUS FASCIATUS.

PLATE VIII. FIG. 17.—(CABINET OF THE LYCEUM.)

Lacerta fasciata. LIN. Sys. Nat. p. 209.
Blue-tailed Lizard. PENN. Arct. Zool. Vol. 2, p. 334.
Scincus quinquelineatus? DAUD. Hist. Nat. Rept. Vol. 4, p. 272, and Var. p. 275.
Lacerta quinquelineata. GREEN, Acad. Nat. Sciences, Vol. 1, p. 348.
Scincus id. HARLAN, Med. and Phys. Researches, p. 138.
S. bicolor? ID. Ib. p. 139.
Scincus fasciatus. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 45, pl. 7; and Vol. 2, p. 127, pl. 18, of Ed. 2da. STORER, Mass. Rep. p. 219.

Characteristics. Bluish black above. Body with five yellow lines; the vertebral line dividing into two on the summit of the head. Tail often blue. Length 6 – 8 inches.

Description. Body cylindrical and tapering gradually to the tail, and covered with longitudinal series of imbricated rhomboidal scales. Vertical plate hexagonal; five occipital plates, with large scales behind; eleven orbital plates proper, and two of the upper labial plates, complete the circle: rostral plate large and pentagonal. Nostrils near the snout. Eyes very small. External ear opening large, oval, vertical. Tail cylindrical, continuous with the body, and longer, with a central row of large plates beneath. Vent transverse, with two very large and two smaller scales in front. Fore feet short, scaly, with five small sharp nails; hind feet larger, with long slender toes, also furnished with nails; the second toe longer than the others.

Color. Body of a shining bluish black, and appears alternately striped with black and yellow longitudinal lines; this is produced by five bright yellow longitudinal lines over the upper surface of the body. The central or dorsal line divides on the head, and a branch passes to each nostril; another line on each side begins above the eye, and a third beneath this on each side, all gradually lost on the tail. Abdomen light bluish. Tail deep blue. Extremities brownish above, light-colored beneath.

Total length, 6·0 – 8·0.

This harmless little animal, miscalled the *Blue-tailed Lizard* and *Striped Lizard*, is not uncommon in the southern counties of the State. I did not hear of it in the western districts, although I presume it is to be found there. It is frequently found under the bark of trees. Mr. Say, in a note to Prof. Green's paper cited above, very properly denies its identity with

the *quinquelineata*, with which it is often confounded, and observes that the ultramarine color of the tail is only apparent when the tail has been broken off and reproduced. I have, however, noticed this color in too many specimens, to induce me to suppose it to be occasioned by such an accident. Dr. Storer has observed this species at Barre, Massachusetts, in latitude 42° 30′, which is its highest northern geographic limits along the Atlantic.

(*EXTRA-LIMITAL.*)

Genus PLESTIODON, *Dumeril* et *Bibron.* Nostrils open in the middle of the nasal plate. Palate with a broad mesial suture, enlarged at its anterior extremity. Sphenoidal teeth, numerous, short, straight, conical. All the scales smooth.

P. erythrocephalus. (HOLBROOK, Vol. 2, pl. 17.) Head large, broad behind, contracted before the eyes, and covered with plates; snout elongated and rounded. Body olivaceous; head bright red. Jaws and sphenoid bones armed with strong teeth. Length 12 inches. *Pennsylvania to Florida.*

Genus LYGOSOMA, *Gray.* Nostrils open in a single plate; anterior frontal plates wanting. Palate without teeth, and with a superficial triangular notch near its posterior margin. Scales of the body smooth.

L. laterale. (HOLB. pl. 8.) Above chesnut, with a line of black on each side. Body beneath yellowish; tail blue. Tail twice the length of the head and body. Length 6 – 8 inches. *Ohio, Southern States.*

L. quinquelineatus. (ID. Vol. 3, pl. 6; and Vol. 2, pl. 17, of Ed. 2.) Dusky above, tinged with green, and marked with five pale lines. Head pale red, with six obscure white lines, the two internal confluent on the occiput. Tail brown. Length 6 – 7 inches. *Ohio, Southern States.*

FAMILY LACERTIDÆ.

Body long, smooth, without spines. Toes free. Tongue long, extensile, deeply forked. Scales of the tail and belly in smooth transverse parallel bands.

Genus AMEIVA, *Cuvier.* Body with minute scales. Head pyramidal, covered with plates. Jaws with numerous notched teeth. Tongue slender, bifid. No bony plate on the orbits. Abdomen with large scales. A row of pores beneath each thigh. Tail long, cylindrical, with verticillate scales.

A. sexlineata. (HOLBROOK, Vol. 2, pl. 15.) Dark brown above, with six yellow longitudinal lines. Abdomen bluish. Tail twice the length of the head and body. Length 12 inches. *Carolina to Florida.*

A. tessellata. (HARL. Med. & Phys. p. 136.) Black, with 9 – 10 longitudinal and 18 – 20 transverse brown and yellowish lines. Scales carinate. Length 12 inches. *Arkansas.* An Ameiva?

FAMILY AGAMIDÆ.

Body depressed, corpulent. Tail and abdomen with small imbricated scales. Head large, inflated, often armed with spines. Throat frequently with a fold, and susceptible of inflation. Tongue short, thick. No palatine teeth. Toes simple, not enlarged, free.

This family embraces many singular and varied forms. Under the following genus are included those animals found in the southern and western part of the United States, and known under the popular names of *Horned frogs, Horned toads, &c.*

(*EXTRA-LIMITAL.*)

Genus PHRYNOSOMA, *Weigmann.* Body nearly orbicular. Head short, rounded in front; bordered laterally and anteriorly with strong spines, and covered above with polygonal subequal scales. Occipital plate semicircular.

P. cornutum. (HOLBROOK, Vol. 3, pl. 9.) Head with a range of long spines on each side of the lower jaw. Nostrils within the internal margin of the superciliary ridge. Abdomen with carinate scales. *Missouri.*

P. orbiculare. (ID. Vol. 3, pl. 10.) Lower jaw without spines. Nostrils at the anterior extremity of the superciliary ridge. Abdomen with smooth scales. *Louisiana, Arkansas.*

P. coronatum. (ID. pl. 11.) A series of eleven spines behind the head. Nostrils as in the preceding. Eight series of large rhomboidal elongated and pointed scales under the chin, reaching to the throat. A row of spines on each side of the tail to the tip. *Oregon.*

P. douglasii. (ID. pl. 12.) Nostrils as in the preceding. Head with tubercles, and not spines, on the posterior part. Body above with slightly elevated tubercles, smooth; scales beneath. Eighteen femoral pores on each side. *Oregon.*

GENUS TROPIDOLEPIS. *Cuvier.*

Body oblong, depressed, and covered with imbricated and carinated scales. Head short, depressed, rounded in front; occipital plate large. Thighs with a series of distinct pores. Neck contracted, smooth beneath. No dorsal nor caudal crest.

THE BROWN SWIFT.

TROPIDOLEPIS UNDULATUS.

PLATE VIII. FIG. 16. — (STATE COLLECTION.)

Lacerta undulata. DAUDIN, Hist. Nat. des Reptiles, Vol. 3, p. 384.
L. hyacinthina et *fasciata.* GREEN, Acad. Nat. Sciences, Vol. 1, p. 349. (Male and female.)
Uromastyx. MERREM, p. 57.
Agama undulata. HARLAN, Med. and Phys. Res. p. 140.
Tropidolepis undulatus. CUVIER, apud Griffith, Vol. 9, p. 126.
Sceloporus undulatus. GRAVENHORST, Nova Acta, Vol. 18, p. 768.
Tropidolepis undulatus. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 51, pl. 8; and Vol. 2, p. 73, pl. 9 of Ed. 2da.

Characteristics. Brownish, with deeper brownish irregular transverse undulating bands. Beneath green, with a large white cross. Length 5 – 8 inches.

Description. Body short, cylindrical, rather tumid, with imbricated pointed scales arranged in obliquely transverse series; these scales are carinated on the back and sides of the body, each carina ending in a sharp point. On the tail, the scales are verticillate and carinate above and beneath, commencing behind the vent. On the throat and underside of the body, the scales are somewhat smaller, smooth, rhomboidal, the tips often broken or notched into two or more jagged points. Head moderate, sub-quadrate, depressed above, obtusely pointed at the snout, and covered with rough imbricated scales. Terminal plate transversely oblong, triangular. Nostrils round, patent, near the end of the rostrum, each surrounded by ten small plates; behind these are placed the larger plates of the head, of which the anterior is hexagonal, and the posterior largest. From beneath the nostrils, proceeds a series of acutely carinated scales. Eyes moderate, with eyelids covered by minute plates. Ear openings very large, vertical. Minute recurved teeth in each jaw, and a sensible roughness on the palate. Tongue thick and fleshy, slightly fissured at the tip. A duplicature of the skin of the neck behind the ear openings, which scarcely amounts to a gular fold beneath. Fore feet slender, covered above and on the sides with carinated scales, which become gradually effaced on the fore-arm and fingers; beneath smooth. Fingers five, slender, and all covered with very acute curved nails; the thumb shortest; the next equal to the outer in length; the two others longest, subequal. Length of the fore extremities, 1·0; of the hind legs, 1·5. These latter are likewise covered on the upper surface and the sides with the same carinated pointed scales, but they are continued over the metatarsus. Toes five, very long and slender, the internal shortest; the fourth from this, half an inch long. On the under side, and rather behind, is a distinct series of from sixteen to eighteen elevated pores; posterior to this is a semicircular fold, covering a foramen; and behind this, the vent, forming a transverse fissure.

Color. Above of a reddish brown hue, with irregular waved bands of a darker color. Beneath the chin, abdomen and under sides of the extremities and tail, dingy or yellowish white. Throat and sides of a deep indigo or greenish blue. These colors are so disposed, that the underside of the animal appears as if marked with a long white cross. Toes whiteish, obscurely banded with brown. In a young individual, two inches long, the color was deep olive brown, and the waved or zigzag marks were black, margined posteriorly with ash grey; the toes, fingers and tail annulate with grey; beneath uniform pearl grey, with several dusky longitudinal streaks on the posterior part. In another specimen, eight inches long, the dorsal marks and the sides were bright chesnut.

Dimensions of the specimen described above.

Total length,	5·5.
Length of the body to the vent,	1·8.
Length of the head measured to the ears,	0·6.
Ditto of the tail,	3·2.

This is an active little reptile, abounding in forests, and apparently preferring the pine, upon which it is often seen in pursuit of insects. It was first introduced into my published list of

the New-York Reptiles on the authority of Dr. Eights, who informed me that he had taken it near Fishkill, Dutchess county. I have since obtained it from Coldspring, Putnam county. It is common over the southern and western States; is extremely active, moving with almost incredible celerity; and when irritated in confinement, elevates its spinous scales in such a manner as to present a very formidable appearance.

It inhabits in preference sandy and rocky situations; and from its abundance in pine forests, has obtained the name of *Pine Lizard*. It is also called the *Brown Scorpion*, and its activity has doubtless suggested the name of *Swift*.

It is perfectly harmless, notwithstanding its apparently venomous aspect. Like the Chameleon, and many other reptiles, it has the property of changing its color, the back assuming an azure tint; and by candle light, the blue stripes on the sides assume a dark brown or chesnut color. From the observations of Messrs. Say and Peale, it would seem that the bluish color beneath, and the white crucial mark, belong exclusively to the male.

The Brown Swift is found throughout the west, and extends from the Gulf of Mexico to the forty-third degree of north latitude.

(*EXTRA-LIMITAL.*)

T. umbra. (HARLAN, Med. and Phys. p. 140.) Burnt chesnut color; beneath pale ash; under side of neck deep blackish violet. Occiput spinous. Length 15 inches. *Mexico.* An Tropidolepis.?

FAMILY OPHIOSAURIDÆ.

Scales as in the Scincidæ. Body more elongated, serpentiform. Feet small, rudimentary, varying in number, four or two; these latter are either in front or behind.

OBS. This family connects the order Sauria with the following.

Genus CHIROTES, *Cuvier.* Body slender, snake-like. Scales verticillate. Head obtuse. Two anterior feet only.

C. lumbricoides. (SAY, Long's Exped. Vol. 1, p. 484.) With two short fore legs; four toes to each, and the rudiment of a fifth. Eyes small. 220 semi-rings on the body, and as many beneath. Length eight to ten inches. *Missouri.*

ORDER III. OPHIDIA.

Body long, cylindrical, continuous with the tail, covered with plates or scales. Without feet. Jaws with numerous small teeth, and some with long poisonous fangs. Carnivorous.

Obs. This is an exceedingly numerous order, more than three hundred and fifty species having been enumerated from the tropical and temperate regions of the globe. In this State we have but sixteen to describe; and of these, but two are venomous. The order is divisible into several families, characterized by the arrangement and form of the scales, by their habitual residence on land or in the water, and by the presence or absence of poisonous fangs. Of the first family, Hydrophidæ or Water Serpents, characterized by a compressed head and body, and usually with poisonous fangs, we have none; they inhabit principally the waters of India and the Indian ocean. A representative of the next family is found in the United States, but not in this State.

FAMILY ANGUIDÆ.

Head and body covered with smooth imbricate scales, in distinct series. Bones of the shoulder and pelvis generally existing in a rudimentary state, under the skin. Tongue short, bifid. Short teeth applied against the internal sides of the jaws.

The various genera composing this family, with some already described, have been arranged by modern systematists into two families, under the names of Saurophidæ and Ophiosauridæ, which are sufficiently distinctive as pointing out their greater or less affinity with the Serpents proper, or the Sauria, and such as have hitherto been arranged under the preceding order.

(*EXTRA-LIMITAL.*)

Genus Ophisaurus, *Daudin.* Body cylindrical, rather robust. Ears visible externally. Scales square, smooth, thick, semi-imbricated; a longitudinal fold on each flank, formed by smaller scales. No vestiges of limbs. Minute sharp teeth in the jaws. Vent nearly medial.

O. ventralis. Glass-snake. (Daud. Vol. 7, pl. 88.) Brownish or greenish, spotted with black. Fourteen rows of scales above, twelve below. Tail longer than the body. Length 2–3 feet. *Western and Southern States.*

FAMILY COLUBERIDÆ.

Serpents with no venomous fangs. No anal appendices.

GENUS COLUBER. *Linneus.*

Head with large polygonal plates. Body with rhomboidal, carinated or smooth scales. Abdomen with single broad transverse plates; beneath the tail, double. Jaws with simple teeth, uniform in size. Hybernate. Carnivorous.

A very numerous genus, even with all the dismemberments which have followed a more critical examination of their characters. In this State we enumerate five species.

THE BLACK SNAKE.

COLUBER CONSTRICTOR.

PLATE X. FIG. 20. — (STATE COLLECTION.)

Coluber constrictor. LIN. GMEL.
Le Lien. BONN. Ophiologie, p. 15.
Le Couleuvre lien. DAUD. Hist. des Reptiles, Vol. 6. p. 402.
Coluber constrictor. HARLAN, Med. and Phys. Researches, p. 112.
The Common Black Snake. STORER, Mass. Report, p. 225.
C. constrictor. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 69, pl. 15. KIRTLAND, Zool. Ohio.

Characteristics. Black; slate-colored beneath; chin and throat white. Scales smooth. Abdominal plates 175 – 185; caudal, 85 – 90. Length 3 – 6 feet.

Description. Head rather smaller than the body, which begins to taper from the vent. Rostral plates convex, prominent; the first subquadrate, smaller than the second, which are irregularly five-sided, the central plate largest. Upper labial plates sixteen. Gular plates five pair, the three anterior elongated. Eyes moderately vertical. Nostrils large, vertical, placed between the first and second pair. Body covered with smooth rhomboidal scales; beneath, with broad entire plates; beyond the vent, the caudal plates are in pairs, occasionally interrupted by an entire plate. Length of the tail, compared to the total length, is as one to four nearly.

Color. A uniform shining bluish black above; margin of the jaws, chin and throat white. Belly usually slate-colored, or bluish white. Young, spotted and speckled with black and white above.

Abdominal plates,	180.
Caudal plates,	88.
Length,	36·0 – 85·0.

The specimen which furnished the preceding description was forty inches long. I have never myself seen one of the greatest size mentioned above, but it was stated to me by a person upon whose scrupulous accuracy I place implicit reliance.

The Black Snake is a bold, active, wild and untameable animal. It climbs trees with great ease, by coiling itself round the trunk in a spiral manner, in search of eggs and young birds. Although perfectly free from any venomous qualities, they will, on some occasions, make considerable resistance, and even pursue an enemy who retreats before them. In various parts of the State, they have the popular names of *Racer*, *Pilot* and *Black Snake*. They feed on frogs, toads, and the smaller quadrupeds and birds. The lovers of the marvellous have attributed to this and many other species the power of fascination. This wonderful power, as far as I have heard, seems to be confined exclusively to birds. All the phenomena witnessed on such occasions may be readily solved by the terror occasioned by the snake's appearance near their young, and by the well known artifices resorted to by many birds to mislead an enemy. Many years since, I examined, in the collection of Dr. Mitchill, a large snake which had been sent from Massachusetts, and had been described, I know not upon what authority, as the young of the Sea Serpent. Its vertebræ were diseased nearly throughout the whole extent of the column; but as it clearly belonged to this species, the name of *Scoliophis atlanticus* must be expunged from the systems.

The Black Snake extends from Canada to the Gulf of Mexico. According to Stedman, it is found in Surinam. It is numerous over the Western States to the Rocky Mountains. Dr. Kirtland observes, that in Ohio, it is evidently on the increase as the State becomes cleared and cultivated.

THE PILOT BLACK-SNAKE.

COLUBER ALLEGHANIENSIS.

PLATE XII. FIG. 26.

Coluber alleghaniensis. HOLBROOK, N. Am. Herpetology, Vol. 1, p. 111, pl. 20.

Characteristics. Black. Scales carinate. Length 5 – 6 feet.

Description. Head long and large; vertical plate pentangular, short and broad; temporal variable, consisting sometimes of two or three narrow plates, or their place chiefly occupied by the last labial plates very much enlarged. Posterior orbital plates two in number; the anterior orbital single and very large, the local small and trapezoidal. Nostrils lateral. Eyes rather large; pupil black; iris brown. Neck small; the body much elongated, fusiform, or tapering at each extremity. Scales oblong, oval, and bipunctate at the apex; those on the back have a distinct carina; the four or five inferior rows on each side smooth; broader on the tail, and hexagonal. Tail short, tapering.

Color. Head black above; marginal plates silvery white, edged with black; throat silvery white. Body above, intense polished black; in certain lights an intense brown may be perceived. Many of the scales have marginal dashes of white, which are only evident when the

skin is distended; towards the tail, however, the scales are entirely black. Beneath, the anterior part of the abdomen is white, clouded with brown, and the posterior part of the tail entirely slate color.

Abdominal plates,	235 – 240.
Caudal plates,	60 – 72.
Length,	60·0 – 72·0.

I am indebted to my friend Dr. Holbrook for the above description of this large species, which is found in the Highlands, but which I have never met with. It is manifestly the snake which has been frequently described to me, of great length and prodigious velocity, and to which they gave the name of *Racer* and *Pilot*. As these names are also frequently applied to the Black Snake, I had supposed that species to have been intended by their descriptions.

The Pilot Black-snake appears to select in preference elevated rocky situations, for it is found along the Allegany mountains as far south as Virginia. It has hitherto been confounded with the ordinary Black Snake, but is at once distinguished from that species by the carinated scales.

THE CHAIN SNAKE.

COLUBER GETULUS.

PLATE X. FIG. 21.—(CABINET OF THE LYCEUM.)

Coluber getulus. LIN. Syst. Nat. p. 382.
Chain Snake. CATESBY, Carolina, pl. 52.
La Couleuvre chainé. DAUDIN, Hist. Rept. Vol. 6, p. 314, pl. 77, fig. 1.
C. getulus. SAY, Am. Jour. Vol. 1, p. 261. HARLAN, Med. & Phys. p. 122.

Characteristics. Black. Thirty to forty narrow yellowish lines over the body and tail. Tail one-eighth. Length four to six feet.

Description. Body long and slender. Head small, and covered with nine plates exclusive of the rostral (see figure). The occipital plates very large; the central or vertical plate three-sided, or sub-pentagonal; supra-orbital slightly enlarged behind; post-orbital small, two in number; ante-orbital plates two, of which the anterior is smallest, and applied against the posterior nasal; anterior nasal plate excavated behind; rostral plate deeply notched beneath. Marginal plates of the upper jaw, seven on each side; on the lower jaw, nine on each side. Two pair of oblong gular plates. Teeth small, subequal, curved backward. Mouth wide. Eyes moderate. Scales oblong, hexagonal, smooth. Tail about one-eighth of the total length, with uniform bifid plates; apex corneous.

Color. Above varying from rufous brown to black. Plates of the head, chocolate-color, with abbreviated dashes of yellow or whitish. Marginal plates of the jaw, dull, or yellowish white, bordered with dark brown. About an inch apart over the back are many narrow yellowish bands, which unite with each other on the sides near the abdominal plates; these bands

are continued to the extremity of the tail, and from a fancied resemblance to a chain, has given rise to one of its popular names. Beneath metallic dingy white, tessellated with brown.

Abdominal plates,	220.	Total length,	42·0.
Caudal plates,	47.	Tail,	5·5.

This beautiful snake, which from the celerity of its movements has also acquired the name of the *Racer*, is not uncommon in the pine woods of New-Jersey, and is also found, but rarely, in what are called the *Brush plains* of Long Island. They are perfectly harmless, and feed on other reptiles. Their northern and eastern range does not extend beyond New-York, and they are found as far south as Louisiana. My friend Dr. Holbrook has arranged this species under the genus *Coronilla* of Laurenti and Schlegel. Its characters, however, do not appear to me to be sufficiently precise and distinct.

THE MILK SNAKE.

COLUBER EXIMIUS.

PLATE XII. FIG. 25. — (STATE COLLECTION.)

Coluber eximius, Dekay. HARLAN, Med. and Phys. Researches, p. 123.
C. calligaster? var. SAY. HARLAN, Ib, p. 122.
Chicken Snake. STORER, Massachusetts Report, p. 227.
C. eximius. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 69, pl. 15.

Characteristics. Ovate chesnut spots over the back; dark quadrate spots on a light-colored ground, beneath. Length two to five feet.

Description. Body elongated, tapering rather suddenly from the vent to the tip of the tail. Head small; neck somewhat contracted. Rostral plate large, emarginate beneath; central plate pentagonal, large; occipital plates very large; upper labial plates fourteen, sixteen beneath. Body covered with smooth sub-hexagonal scales. Tail ending in a corneous tip, and about one-eighth of the total length. Abdominal scales occasionally divided.

Color. Large irregularly ovate chesnut-colored spots, bordered with black, and varying in number from thirty to fifty, are distributed along the whole upper surface of the body and tail. These spots are often minutely punctate with red; and the spots themselves are so disposed, that when viewed from above at a short distance, the body might be said to be annulate with white. On the flanks are similar smaller chesnut spots, alternating with those above. On the summit of the head is often seen a reddish semicircular band, extending from one eye to the other; and a large irregular reddish spot on the occiput, lighter in the centre, margined with black. The colors are very vivid at certain seasons, but change almost instantaneously after death; the large deep chesnut blotches becoming greyish, and the abdomen almost white. Beneath light pink when alive, passing into pearl grey, with many irregular quadrate dark spots.

Abdominal plates,	195 – 205.	Length,	36·0.
Caudal plates,	38 – 45.	Tail,	5·0.

This species has been, I suspect, strangely confounded with the *Trigonocephalus contortrix*, the arrangement and distribution of the colors agreeing tolerably well. In its markings, it approaches much nearer to the *doliatus* of the Naturalist's Miscellany (Vol. 7, p. 254), and more closely still to the *C. lichtensteinii* of Wagler. It is needless, however, to add that it is specifically distinct from both.

This innocent and beautiful snake is common throughout this State. It has been also observed in Massachusetts, Pennsylvania and Ohio. In this State, its most usual popular name is *Milk Snake*, although it has various other appellations. It is called *Chicken Snake*, *Thunder and Lightning Snake*, *House Snake*, and *Chequered Adder*. In some parts of Westchester it is called the *Sand-king;* but for what reason I cannot imagine. In Suffolk county, a large snake resembling this has been described to me under the name of *Sachem Snake*.

It is not unfrequently found in outhouses, and in dairies or cellars where milk is kept, which it is said to seek with avidity. It climbs well, and glides rapidly over the smoothest surfaces. It is rare to find them exceeding four feet; the more usual length is about two.

THE RING SNAKE.

COLUBER PUNCTATUS.

PLATE XIV. FIG. 29. — (STATE COLLECTION.)

The Small Black and Red Snake. EDWARDS, Gleanings, Vol. 7, p. 289, pl. 349.
Coluber punctatus. LIN. Syst. Nat.
C. torquatus. SHAW, Gen. Zool. Vol. 3, p. 553.
La Couleuvre ponctuée. DAUD. Hist. des Reptiles, Vol. 7, p. 178.
Homolosoma punctatus. WAGLER.
Natrix edwardsii et *punctatus.* MERREM, Versuch. p. 131, 136.
C. punctatus. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 115, pl. 26. SAY, Am. Jour. Vol. 1, p. 261.
C. punctatus. HARLAN, Med. and Phys. Res. p. 117. STORER, Mass. Report, p. 225.

Characteristics. Small. Bluish brown; beneath, red; often with a triple row of black dots; a white collar around the neck. Length 12 –18 inches.

Description. Body slender, elongated, with smooth rhomboidal scales. Head small, flattened above, with ten plates on the surface. Nose rounded. Labial plates above, seventeen; beneath, fifteen. Nostrils and eyes large. Tail nearly one-fourth of the total length, acute, ending in a horny tip. Anal plate often divided.

Color. Above bluish brown, approaching to black. Head lustrous, black. Across the occiput a yellowish white collar round the neck, margined with black; occasionally the collar is not perfect, but in its place two or more whitish blotches. Beneath yellowish white, and more frequently deep reddish orange. At the junction of the dark color above with the lighter

color beneath on the flanks, the colors unite in such a way as to leave a series of dark triangular marks, giving it a serrated appearance; these serratures are continued to the tip of the tail, and become effaced towards the head. In adults, the abdomen for the most part immaculate; in the young, a minute dark point on the middle of the edge of every abdominal plate, as far as the vent.

Abdominal plates,	145 – 155.	Length,	12·0 – 18·0.
Caudal plates,	45 – 55.	Ditto of tail,	3·0 – 4·0.

This pretty little snake is found in every part of the State. It occurs under rocks and stones, and is frequently seen under the bark of decayed trees. It is very common under the bark coverings of the huts of the frontier settlers. Feeds upon worms, insects, grubs, etc., and is perfectly inoffensive. Emits a strong and disagreeable odor. Occurs from Maine to Louisiana.

THE GRASS SNAKE.

COLUBER VERNALIS.

PLATE XI. FIG. 22.

Coluber vernalis, Dekay. HARLAN, Med. and Phys. Researches, p. 124.
C. id. STORER, Mass. Report, p. 224. HOLBROOK, N. Am. Herp. Vol. 3, p. 79, pl. 17.
Green Snake. KIRTLAND, Zoology of Ohio, p. 188.

Characteristics. Small. Green, with smooth scales. Length one to two feet.

Description. Body slender, tapering regularly to the tip of the tail, and covered with smooth rhomboidal scales. The tail is so much attenuated as to render it difficult to count the caudal scales. Anal plate frequently bifid. Head small, flattened above, slightly larger than the neck. Labial plates above, fifteen; the rostral plate emarginate in front. Plates of the head, 2.2.3.2.

Color. Grass green above; beneath white, tinged with yellow; head dark olive-brown; upper labial plates and throat dull white.

Abdominal plates,	125 – 135.	Total length,	12·0 – 26·0.
Caudal plates,	80 – 90.	Tail,	4·0 – 6·5.

This innocent and beautiful species, known in this State as the *Green* or *Grass Snake*, has long been confounded with the *estivus* of the Southern States, from which it is readily distinguished by its inferior length and carinate scales. It feeds on insects, and is exceedingly lively and quick in its movements. It is very numerous in the marshes about Salina and Cayuga; and, as I have been informed by credible eye-witnesses, fights furiously with the Striped Snake previously described. Its color changes upon immersion in alcohol, from a brilliant green to a dull blue. I am inclined to suspect, that in this State, it has been

described as *ceruleus* by Linneus; always supposing an error to exist in his enumeration of the subcaudal plates.

The Grass Snake is found from Massachusetts to Pennsylvania. It is also seen, but not abundantly, in Ohio.

(*EXTRA-LIMITAL.*)

C. guttatus. (Holbrook, Vol. 2, pl. 24.) Smooth. Reddish brown above, with a series of deeper red large blotches, margined with dusky; beneath white, with quadrate black spots. Abdominal plates, 126; caudal, 64. Length four to six feet. *Southern States.*

C. couperi. (Id. Vol. 3, pl. 16.) Head triangular, thick. Scales very large, bluish black. Beneath bluish black, and reddish about the throat. Length ten to twelve feet. *Carolina, Georgia.*

C. sayi. (Id. Vol. 4.) Large. Body robust, elongated, black, covered with numerous small rounded yellowish white spots over the head, body and tail. *Alabama.*

C. testaceus. (Id. Vol. 3, pl. 13.) Body above pale, sanguineous or testaceous; beneath sanguineous, immaculate. Abdominal plates, 198; caudal, 80. Length five feet. *Rocky Mountains.*

C. quadrivittatus. (Id. Vol. 1, pl. 21.) Carinate. Greenish clay-color above, with four longitudinal bands; yellowish beneath. Abdominal plates, 233; caudal, 90. Length 4 – 6 feet. *Carolina, Florida.*

C. occipitomaculatus. (Storer, Mass. Rep. p. 230.) Small. Greyish, with an indistinct lighter band along the back; three large white spots behind the occipital plates. Scales smooth. Abdominal plates, 124; caudal, 38. Length 10·5. *Massachusetts.*

C. obsoletus.
C. rhombomaculatus. } (Holbrook, ined.)
C. doliatus.

GENUS TROPIDONOTUS. *Kuhl.*

Head oblong ovate, depressed, distinct. Two nasal plates. Eyes moderate; pupil round. Loral plate single; anterior orbital plate the same. Scales sub-hexagonal, notched posteriorly, elongated and strongly carinated.

Obs. The animals of this genus possess the power of elevating the ribs, and are thus enabled to flatten the body. This enables them to swim well, and hence they are all more or less aquatic. In this State four species have been observed.

THE WATER SNAKE.

TROPIDONOTUS SIPEDON.

PLATE XIV. FIG. 31. — (STATE COLLECTION.)

Coluber sipedon. LIN. Syst. p. 379.
C. porcatus? DAUD. Hist. Reptiles, Vol. 7, p. 204.
Brown Water Snake. HARLAN, Med. & Phys. Researches, p. 114.
The Water Adder. STORER, Mass. Report, p. 228.
Tropidonotus sipedon. HOLBROOK, N. Am. Herpetology, Vol. 4, p. 29, pl. 6.

Characteristics. Dark brown, or obscurely banded with darker; beneath white, varied with brown or rufous. Abdominal plates, 130 – 35; caudal, 70 – 75. Scales strongly carinate. Length two to five feet.

Description. Body robust. Tail rather abruptly tapering. Scales sub-imbricate, carinate; those on the three or four series adjacent to the middle of the back, so conspicuously carinated as to exhibit the appearance of deep grooves between them. The tail ends in a consolidated corneous tip, popularly termed a *horn*. Plate on the head large, the vertical or central pair largest; labial plates above sixteen, beneath eighteen.

Color. This is exceedingly variable, and does not appear to depend on age; for in very small ones of the same size, the markings are often dissimilar. Usually of uniform dull brown color above, dark mahogany colored sides, and white varied with reddish beneath. In the specimen figured on the plate, which was two feet and a half long, the following was the arrangement of the colors: Back dark ash; on the sides a series of dark chocolate-colored vertical bands, fifty-seven in number, dilated over the back, narrowed on the flanks, and margined with blackish, the intervening spaces ash-colored. Beneath, marbled with cinereous and coppery. Chin white; sides of the jaws whitish; numerous short, dark, vertical stripes. A black spot in front on the chin. Upper surface of the head uniform, polished, dark brown.

Abdominal plates, ...	140.	Total length, ...	30·0.
Caudal ditto, ...	75.	Length of tail, ...	8·0.

All the colubrine snakes take to the water more or less, and move about in it with great ease; but this species may be said to live in it habitually. It is called indifferently the *Water Snake* or *Water Adder*, and is erroneously said to be poisonous. It is frequently found in fields which are occasionally overflowed, feeding upon frogs and fishes. One was found to have swallowed a small pike. A correspondent of the Monthly American Journal of Geology asserts that he once saw a water snake lying on a bush over a stream, under which some chubs were swimming; he watched the snake, and saw it fall or plunge into the water from the bush, and seize a chub. Although of a sullen vicious temper, and with a threatening aspect, it is completely harmless.

The Water Snake is found in this and the States adjacent to us on the east. It also occurs in Pennsylvania and Ohio, but I am unacquainted with its southern geographical limits.

THE STRIPED SNAKE.

TROPIDONOTUS TÆNIA.

PLATE XIII. FIG. 27. VARIETY. — (STATE COLLECTION.)

Coluber sirtalis? LIN.
C. triple rang? LACEPEDE, Vol. 2, p. 131, pl. 4, fig. 2.
C. tænia. Die Band Schlange. SCHŒPFF, Reise, Vol. 1, p. 496.
C. terordinatus? LATREILLE, Hist. Reptiles, Vol. 4, p. 70.
C. triple rang. DAUDIN, Vol. 7, p. 151.
La Couleuvre sirtale. DAUD. Hist. Reptiles, Vol. 7, p. 146.
C. sirtalis. HARLAN, Med. and Phys. Researches, p. 116. STORER, Mass. Report, p. 221.
Tropidonotus sirtalis. HOLBROOK, N. Am. Herpetology, Vol. 4, p. 41, pl. 11. KIRTLAND, Ohio, p. 188.

Characteristics. Body robust; tail short, suddenly tapering, one-sixth of the total length. Greenish brown, with three light-colored stripes along the body. Length 2 – 4 feet.

Description. Body stout, covered with oblong strongly carinate scales, with the exception of a series of what may be termed accessory abdominal plates along the flanks; these, however, under the lens, show a slight carination. Head pyramidal, flattened above, with four series of plates behind the rostral plate, the posterior or occipital largest. Rostral plate rather more upturned than in the following species. Fifteen labial, including the rostral plate, above, and twenty-one beneath. The intermediate plates between the second pair of gular plates, narrow, subequal. Numerous minute recurved teeth, in the jaws and palate. Tail short, rapidly attenuated to the tip; often calcarate, or with a horny tip.

Color. Above darkish brown, and in some lights an olive green.* Three greenish yellow stripes along the whole length of the body; one on the centre of the body, and one along each side. The dorsal stripe commences a short distance behind the occipital plates. The lateral stripes, after passing the vent, become confounded with the general color of the tail. A row of obsolete black spots (in spirits usually very manifest) on each side of the dorsal stripes, and a similar series on the upper margin of the lateral stripes. These spots are frequently alternate, occasionally confluent. Beneath, neck yellowish white; abdomen and tail greenish yellow, with occasionally irregular black spots on the upper edges of the abdominal plates; these are sometimes effaced, and their places supplied by a cloud of brownish: this is, however, rare. In the young the stripes are greenish (blue in spirits), the dark dorsal

* It is rare to find, among the ophidian reptiles, any two of exactly the same shade of color, even when alive; this appearing to depend upon the latitude, season, and plentiful or scanty supply of food. In cabinet specimens, these discrepancies are still greater; and colors, which in the living subject are scarcely apparent, become very conspicuous after having been immersed in liquors of different strength and qualities. A good guide is much wanted to exhibit the changes which certain colors undergo after immersion in spirits. It has been ascertained that the brilliant green of reptiles changes to dull blue; yellow changes to white; the black, brown and metallic colors remain unaltered; red becomes brownish, or is finally obliterated. It may not be unimportant to add, that by exposing a reptile which has been for some time in spirits, for a short time to the rays of the sun, we may, by the reflected light, form some judgment of the original markings.

spots more obvious, and the two large black ovate spots behind the occipital plates; the tail more slender than in the adult, but its relative proportions are the same. We reduce all the various appearances presented by different individuals observed in this State, to the following varieties, but doubtless many others may be observed:

Var. a. Reddish above; spotted between the scales with dusky; the dorsal stripe bright red, the lateral ones yellowish.

Var. b. Light-colored above, with a row of dark spots in place of dorsal and lateral stripes. We suppose this may have been possibly intended for the *triple rang* of Lacépède, cited above.

Var. c. The dorsal stripe alone visible, with two series of alternate black spots on each side. It is this variety which we have selected, as it has often been confounded with another species not found in these latitudes.

Var. d. The whole under surface of a deep mahogany color.

Abdominal plates,	145 – 155.	Length,	42·0.
Caudal plates,	55 – 65.	Ditto of tail,	7·0.

The short linnean description of *C. sirtalis*, from a specimen furnished by Kalm, may possibly have been intended for this species; but the characters are too insufficient and too inaccurate to authorize the adoption of that name.

On the authority of my lamented friend, the late Mr. Say, (in letters to me,) I had been disposed to refer the species under consideration to the *ordinatus*. Linneus, however, had evidently some small southern species in view; and this is evident from his reference to the 52d plate of Catesby, which is entirely inapplicable to our species. The accompanying text of Catesby, throws no light on the subject: "Green spotted plate; these grow to four times "the bigness of the figure. I would willingly avoid mistakes by describing the same serpent "twice, and multiplying this kind to more than there are; and I am diffident in determinating "whether this be a different species from the spotted ribbon snake (pl. 51), which somewhat "resembles it, though of a different color." It is remarkable that Linneus no where cites this plate 51, which Catesby accompanies with the following text: "A slender snake; the "upper part brown, spotted with black; belly white; on the ridge of the back, extends a list "(band) of white the whole length of it."

In the Dictionnaire des Sciences Naturelles (Edition de Levrault), the *sirtalis* is arranged among the species which are too little known to merit transcribing, or which have been confounded with others, and the *ordinatus* is passed over in silence. We leave it to our southern naturalists to determine what species was intended by *ordinatus*, or whether that and *sirtalis* should not be expunged from the systems.*

* Since writing the above, I perceive that the true *ordinatus* has been re-discovered by Dr. Holbrook.

The first positive notice which I have been enabled to find of this species, is contained in the Travels of Schœpff.* The following extract indicates plainly enough this species: "*Die "Band Schlange, Garter Snake, Coluber tænia.* (Scut. abdom. 145 – 148; squam. sub- "caud. 60 – 65.) About three to three and a half feet long; the blackish brown back has "three handsome pale yellow (blatzgelbe) narrow stripes running straight from the head to the "tail, by which these serpents are readily recognized."

The Striped Snake is of a robust clumsy make, and is comparatively sluggish in its movements. It is known under various popular names, such as *Green Garter-snake, Slow Garter, Swamp Garter, Water Garter, Striped Adder, &c.* It feeds on frogs, toads, and the smaller quadrupeds. It takes the water readily in pursuit of its prey, and chiefly affects low marshy places. When irritated without the means of escape, it elevates its scales in such a manner as to give the whole body a peculiarly roughened appearance; and under such circumstances, will bite, and leave a troublesome though not dangerous wound. In Ohio, according to Kirtland, its numbers are rapidly decreasing; as it is eaten by hawks, owls, hogs, and in some instances by fowls, ducks and turkeys.

It is our most common species, and I have even noticed it in the northern parts of the State at an elevation of two thousand feet above the tide water. It extends to Canada. It is frequently found in great numbers, and sometimes in company with rattlesnakes, under peat moss, at a sufficient depth to protect them from frost. In the neighborhood of New-York, they retire about the beginning of October, and reäppear about the last of May, although their times of appearance and retreat vary very much with the nature of the season.

THE YELLOW-BELLIED SNAKE.

TROPIDONOTUS LEBERIS.

PLATE XI. FIG. 23.

Coluber leberis. KALM, Travels in the U. S. LINNEUS, Syst. Nat.
Vipera id.? DAUDIN, Hist. Reptiles, Vol. 6, p. 218.
C. septemvittatus. SAY, Jour. Acad. Nat. Sc. Vol. 4, p. 240. HARLAN, Med. & Phys. Res. p. 118.
Tropidonotus leberis. HOLBROOK, N. Am. Herpetology, Vol. 4, p. 49, pl. 13.

Characteristics. Olive brown, with three black lines; beneath yellow, with four distant longitudinal series of quadrate spots. Length two to three feet.

Description. Head small, rounded in front. Vertical plate pentagonal, broadest in front; frontal plates hexagonal, descending on the sides of the head so as to join the loral plate. Rostral plate six-sided; occipital pentagonal, smaller, notched behind. Nasal plates two, quadrilateral, subequal. Nostrils lateral, near the snout. Neck contracted, covered with

* Schœpff came out to this country as surgeon to a band of German mercenaries employed by England during the Revolutionary war. He is favorably known by his various papers in the Transactions of the Berlin Natural History Society, on the Fishes of New-York; and by his Historia Testudinum, and a work on the Mineralogy of North America.

small carinate scales. Body above with hexagonal strongly carinate scales, slightly notched behind. Tail long and slender.

Color. Head above olive-brown; lips yellowish. Body above olive-brown, with three longitudinal dusky lines; beneath with four parallel dusky longitudinal lines.

Abdominal plates,	143.
Subcaudal,	70.
Length,	25·0 – 36·0.

I have never seen this serpent in the State of New-York; but Dr. Holbrook, whose description I have availed myself of, has observed it not only in this State, but in New-Jersey, Pennsylvania, Ohio and Michigan. Little is known of its habits. It is said to affect water and moist places.

THE SMALL BROWN SNAKE.

TROPIDONOTUS DEKAYI.

PLATE XIV. FIG. 30.—(STATE COLLECTION.)

Coluber dekayi. HOLBROOK, N. Am. Herpetology, Vol. 4, p. 53, pl. 14.

Characteristics. Reddish brown; a lighter colored dorsal stripe, with a double row of small blackish spots. Length 12 – 15 inches.

Description. Head somewhat elongated, slightly larger than the neck. Body slender, covered with small hexagonal scales, and an accessory row near the abdominal plates much larger. Supra-orbital plates elongated, projecting. Nasal plates two, quadrate, subequal. Frontal plates broad and pentagonal, shortest on their lower margins. Anterior orbital plate single and large; posterior two, subequal. Upper labial plates fifteen; lower, thirteen. Anal plate frequently divided.

Color. Reddish brown, with a darker spot beneath the eye, and another at the angle of the mouth; with two oblong blackish spots on the sides of the occiput. A pale yellowish grey longitudinal stripe extends from the head nearly to the extremity of the tail; on each side of this stripe is a double row of small blackish spots, alternating with each other. Beneath dull yellowish tinged with green, with numerous minute black dots approaching a regular series.

Abdominal plates,	125 – 135.
Subcaudal,	35 – 45.
Total length,	10·5 – 15·5.

I observed this species many years since, and was for some time disposed to consider it as the young of *T. tænia*. Recently my friend Dr. Holbrook has examined it, and determined it to be a new species. All the specimens which I have seen, were either in or near the water. For the specimen figured in the plate, I am indebted to John Crumby, Esq., a zealous sports-

man and acute observer, who captured it as it was swimming across a large bay on the northern coast of Long Island. It has been noticed in Massachusetts, Michigan and Louisiana.

(*EXTRA-LIMITAL.*)

T. ordinatus. (HOLBROOK, Vol. 4, pl. 12.) Five series of small, alternate, subquadrate, dark spots on the sides. Scales carinate. Abdominal plates, 143; caudal, 66. Length 2 – 3 feet. *Maryland and South.*

T. erythrogaster. (ID. Vol. 4, pl. 7.) Brick-dust color, tinged with green at the sides; beneath copper-colored. Abdominal plates, 147; caudal, 60. Length 3 – 4 feet. *Carolina.*

T. niger. (ID. Vol. 4, pl. 9.) Elongated. Dusky brown, almost black; throat and neck milky white; beneath, slate. Abdominal plates, 143; caudal, 64. Length 2 – 3 feet. Found in Massachusetts and Maine, and probably in New-York.

T. rigidus. (ID. Vol. 4, pl. 10.) Brown; beneath brownish yellow. Two contiguous series of oblong dark spots on the centre of the abdomen. Abdominal plates, 133; caudal, 51. *Pennsylvania.*

T. fasciatus. (ID. Vol. 4, pl. 5.) Carinate. Body robust; brownish above, with about thirty oblong red marks on the flanks. Abdominal plates, 140; caudal, 42. Length 2½ feet. *Carolina, Louisiana.*

T. taxispilotus. (ID. Vol. 4, pl. 8.) Carinate. Body robust; above light chocolate, with a triple series of subquadrate and oblong black spots. Abdominal plates, 144; Caudal, 79. Length three feet. *South Carolina, Georgia.*

GENUS LEPTOPHIS. *Bell.*

Head much elongated, suboval, narrow, covered with plates as in Coluber. Loral plate single; one anterior and two posterior orbital plates. Body long and very slender, covered with sub-hexagonal carinate scales. Tail very long.

OBS. Hitherto, but two species have been observed in the United States. They are remarkable for their extreme activity.

THE RIBBON SNAKE.

LEPTOPHIS SAURITA.

PLATE XI. FIG. 24. — (STATE COLLECTION.)

Coluber saurita. LIN. GMEL. CATESBY, Vol. 2, p. 50. pl. 50.
Le Saurite. LACEPEDE, Hist. Nat. des Serpens, Vol. 2, p. 101. DAUDIN, Vol. 7, p. 104, pl. 81, fig. 2.
Anguis eryx. WILLIAMS, Nat. Hist. Vermont.
A. saurita. HARLAN, Med. and Phys. Res. p. 115.
The Riband Snake. STORER, Mass. Rep. p. 229. HOLBROOK, N. A. Herpetology, Vol. 4, p. 21, pl. 4; and Vol. 4, p. 21, pl. 4, of 2d Ed.

Characteristics. Body slender. Tail filiform, nearly half the length of the body. Chocolate-brown, with three yellowish stripes. Length one to two feet.

Description. Body exceedingly slender, rarely exceeding half an inch in diameter; covered with small oblong hexagonal carinate scales. Head small, slightly larger than the neck. Plates on the head, 2.2.3.2, smooth. Labial plates above, fifteen; twenty-one beneath. The intermediate plates between the second gular pair, unequal; the posterior broad, and largest. Vertical plate narrower than in the preceding species. Eyes prominent, conspicuous.

Color. Above chesnut brown or bay, with three narrow bright-yellowish or white longitudinal stripes; the central or dorsal stripe extending to the posterior plates of the head, and the lateral ones passing under the orbits, and dilated into the white of the lower jaw. Beneath dull white, immaculate, verging to greenish under the tail. Lateral portions of the abdominal plates dull chesnut; lower half, as far as the fifth orbital, and the inferior post-orbital plates, white. There are two varieties which seem to merit description:

Var. a. Small black and distinct dots on each side of the dorsal stripe, and along the upper margin of the lateral stripes.

Var. b. The black dots on each side of the dorsal stripe confluent, and forming a black border.

Abdominal plates,..	155 – 165.	Length,.....	12·0 – 24·0.
Caudal plates,.....	110 – 120.	Ditto of tail,....	4·0 – 6·0.

This delicate and graceful little snake is far less common than the preceding. It is more exclusively a southern species, although found sparingly in Massachusetts, and possibly as far east as Vermont.

We are indebted to Linneus for the first authentic account of this snake, under the name of *saurita*. This name indicates its resemblance to a striped lizard; for as the observer views it gliding rapidly among the herbage, he is in doubt whether it is a serpent or a lizard. The characters assigned by Linneus are, however, inaccurate; partly owing to his having trusted to the execrable figure of Catesby, or to altered specimens. "Scutellis 21" is obviously a misprint, which is corrected in the twelfth edition. "Virescens lineis tribus virescentibus," could only have been derived from cabinet specimens, or from a badly colored plate of Catesby. Catesby's notice itself is very meagre, and scarcely accurate: "*Short Ribbon Snake.* Slender, "not much bigger than the figure. Upper part of the body dark brown, with three parallel "white lines extending the whole length of the body; belly white."

The Ribbon Snake, or as it is frequently called in this State, the Little Garter Snake, is an exceedingly nimble animal. It climbs trees, and feeds on toads, frogs, and even the larger insects. It is a gentle animal. It has been confounded with the *C. richardii*, Bory (An. Sc. Nat. Vol. 1, p. 408, pl. 24), but is very distinct. In Ohio, according to Kirtland, it seeks the most retired woods for its residence.

(*EXTRA-LIMITAL.*)

L. æstivus. (Holbrook, Vol. 4, pl. 3.) Carinate. Green above, yellowish white beneath. Abdominal plates 160; caudal 140. Length two feet. *Delaware, Maryland, Louisiana.*

GENUS CALAMARIA. *Boié, Wagler.*

Head small. Two frontal plates descending to form part of the orbit. One anterior and one posterior orbital plate; no loral plate.

THE RED SNAKE.

CALAMARIA AMŒNA.

Coluber amœnus. SAY, Acad. Nat. Sciences, Vol. 4, p. 237.
C. id. HARLAN, Med. and Phys. Res. p. 118.
Zacholus id. WAGLER.
The Red Snake. STORER, Mass. Rep. p. 226.
Calamaria amœna. HOLBROOK, N. Am. Herpetology, Vol. 4, pl. 27.

Characteristics. Small. Reddish brown; beneath red. Scales smooth. Tail short, abrupt. Length 6 – 12 inches.

Description. Body small, cylindrical, with smooth polished elongated obscurely pentagonal scales. Tail about one-seventh of the total length, abruptly attenuated to a solid corneous tip. Head small, obtusely rounded; terminal plate curving slightly on the top of the head, so as to be nearly horizontal above. The first pair of plates short, broader than long; second pair rather large, oblique, the posterior outer angle reaching the eyes. Vertical plate convex, rounded, sub-triangular, wide before, and angulated on the anterior middle; the posterior angle acute. Posterior plates a little convex, with a single scale between their tips. Eyes with one scale behind; one before, twice as long as the posterior one; small plate above the eye, less than half the length of the central plate. Teeth very minute.

Color. Reddish brown or dark slate above; beneath bright red, or rosaceous.

Abdominal plates,	125 – 135.	Length,	5·0 – 10·0.
Caudal plates,	25 – 35.	Tail,	1·0 – 2·0.

This is a beautiful little serpent, found under stones and logs. I have not met with it, but have taken Say's description. Its present geographical limits extend from New-Hampshire to Pennsylvania.

(*EXTRA-LIMITAL.*)

C. elapsoidea. (HOLBROOK, Vol. 4, pl. 28.) Small. Body scarlet, with 18 – 20 white rings, broadly bordered on each side with black. Abdominal plates, 170; caudal, 38. Length 12·0. *Carolina, Georgia.*

C. striatula. (ID. Vol. 4, pl. 29.)

Genus PSAMMOPHIS, *Holbrook.* Plates of the head as in Coluber. Body excessively long and slender. Scales over the tail, not imbricated.

OBS. Under this name, Dr. Holbrook proposes to arrange a group of serpents characterized by various peculiarities.

P. flagelliformis. (HOLBROOK, Vol. 1, pl. 19, Ed. prima; Vol. 4, pl. 2, Ed. secunda.) Supra-orbital plate projecting over the eye. Body long and slender; the anterior part deep black, both above and below; the middle varied with brown and white. Tail one-fourth of the length. Abdominal plates, 203; caudal, 109. *South Carolina, Florida.*

Genus HELICOPS, *Wagler.* Head depressed, smaller than the neck. Loral plate wanting; two posterior, and one anterior orbital plate. Mouth inferior, ascending at the angle; posterior tooth on each side longest. Body elongated, robust, with smooth scales.

H. erythrogrammus. (HOLBROOK, Vol. 4, pl. 25.) Smooth. Bluish black, with three longitudinal red lines and a series of bluish black spots on each side of the abdomen. Abdominal plates, 178; caudal, 39. Length three and a half feet. *Carolina.*

H. abacurus. (ID. Vol. 4, pl. 26.) Smooth. Bluish black above; flanks with transverse bright red bands. Beneath red, with somewhat regularly arranged black spots. Abdominal plates, 195; caudal, 34. Length four feet. *Carolina, Louisiana.*

Genus RHINOSTOMA, *Wagler*, partim. Posterior maxillary tooth long, cylindrical, pointed, fixed. Head not as large as the body. Rostral plate not carinate, but sub-acuminate.

R. coccinea. (HOLBROOK, Vol. 4, pl. 30.) Scarlet, with jet black rings in pairs, not surrounding the body; the black rings separated by yellowish white spaces. Length 2 – 3 feet. *Carolina, Georgia.*

Genus PITUOPHIS, *Holbrook.* Head elongated, oval, four-sided; the snout prolonged. Frontal plates four, in a transverse row. Rostral plate an isosceles triangle; basis rounded and prolonged; apex pointed, and received between the anterior frontal plates. Two anterior and three posterior orbital plates. Teeth rather larger in front. Scales strongly carinated.

P. melanoleucus. (HOLBROOK, Vol. 4, pl. 1.) White, with sub-rotund black or dusky blotches. Abdomen pale cream, with a series of subquadrate black blotches. Abdominal scales, 216; subcaudal, 60, bifid. Length 6 – 7 feet. *Jersey to Florida.* Will probably be found in this State.

GENUS HETERODON. *Pal. de Beauvois.*

Teeth unequal; the posterior maxillary teeth largest. Head triangular, pointed. Rostral plate pyramidal, triangular, ridged above, and pointed at the tip.

THE HOG-NOSED SNAKE.

HETERODON PLATYRHINOS.

PLATE XIII. FIG. 28, A. PLATES OF THE HEAD. — (CABINET OF THE LYCEUM.)

Heterodon à large nez. LATREILLE, Hist. Rept. Vol. 4, p. 32.
Heterodon. DAUD. Vol. 7, p. 153.
Coluber heterodon. SAY, Am. Jour. Vol. 1, p. 261. HARLAN, Med. and Phys. Res. p. 120.
Heterodon platyrhinos. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 97, pl. 21.
H. id. STORER, Mass. Rep. p. 231. TROOST, Ann. Lyc. Vol. 3, p. 183.

Characteristics. Greyish tinged with yellowish, and a triple series of blackish blotches. Dorsal series largest, bordered with black; lateral series smaller, and irregularly rounded. A dark band through the eyes. Length two feet.

Description. Body robust, and covered with oval-oblong carinate scales; the two or three series next to the abdominal plates, smooth. The body tapers rather suddenly from the vent. Tail short, one-sixth of the total length, ending in an acute tip. Ventral scale divided. Head large, triangular, flattened above, with a pointed snout. Teeth in the posterior part of the jaw long, hollow, not perforated, and four in number. The plates cover but a small portion of the head. Central plate irregularly six-sided, the lateral margins being longest, and the anterior meeting at an obtuse angle; supra-orbital oblong, broadest behind, and projecting over the eye. Around the eye are arranged ten small orbital plates; besides these, there are two pair of anterior nasal plates, of which the superior are largest, the lower plate being behind the posterior nasal plate, and furrowed in its centre. Nasal plates two on each side; the anterior lunated behind, the posterior excavated in front to complete the nostril. Occipital plates triangular, with the apices truncated at their junction with the vertical plate. Frontal plate uniting laterally with the anterior and posterior nasal plates; between the frontal plates is a long narrow azygous plate, ridged above, and uniting in a sub-imbricate manner on nearly the centre of this plate with the rostral plate. Rostral plate triangular, upturned in front, with a strong carina on its upper surface, and excavated beneath. Labial plates above eight on each side of the lower jaw; nineteen in all. Nostrils large, lateral, and near the rostrum. Eyes large, prominent. Head in repose not much larger than the neck; but when irritated, it distends to twice its usual breadth, the summit becoming flattened.

Color. Brassy yellow above, with three series of irregular subquadrate or rounded deep chesnut, blackish or ash grey blotches, occasionally united on the posterior part of the body and tail, forming rings; the series on the sides much smaller, and alternating with the larger ones. Summit of the head dark rufous, with irregular blotches and dots of dark brown. A

black dash extends obliquely backwards from the eye to the angle of the jaws. A rounded black spot behind the occiput. Beneath dusky yellowish, or dull whitish.

Young, of a uniform light ashen grey, with the lateral series of spots black, subquadrate, and united with each other across the back by dark-colored bands, with intervening lighter ones. Beneath greenish grey, varied with dusky. A short rufous transverse band in front of the eyes. Over the eyes, a rufous band; becomes dilated on the sides of the neck.

Abdominal plates, .	130 – 142.	Length, ...	12·0 – 25·0.
Caudal plates, ...	42 – 48.	Tail, ...	2·5 – 4·0.

This well known species has a venomous aspect, particularly when irritated, but is entirely harmless. In this State, it has various popular names: *Blauser*, by the early Dutch settlers, from its habit of distending or blowing up the skin of its head and neck; this property I have noticed in very young individuals which I have kept for some time. It is also called *Deaf Adder*, *Spreading Adder*, *Hog-nose* and *Buckwheat-nose*; the latter from some fancied resemblance between that grain and its rostral plate. It is found frequently in dry sandy soils; but I have observed them also in low and wet meadows, apparently in pursuit of frogs, etc. It is rather common in the southern parts of this State. It has been noticed in New-Hampshire and Massachusetts. It occurs in Michigan, Tennessee, and throughout the Western States. Southward it extends to Florida.

(*EXTRA-LIMITAL.*)

H. simus. (Holbrook, Vol. 4, pl. 15.) Azygous plate between the frontal, surrounded by 6 – 8 smaller plates. Grey, with a vertebral series of subquadrate or rounded black spots on transverse bars; tail fawn-colored. Abdominal plates, 132; caudal, 39. Length 12 – 13 inches. *Carolinas, Georgia.*

H. niger. (Id. Vol. 4, pl. 16.) Entirely black; beneath greyish, Body thick and clumsy. Abdominal plates, 135 – 145; caudal, 50 – 55. Length three feet. *Tennessee, Georgia.*

H. annulatus. (Troost, Ann. Lyc. Vol. 3, p. 188.) Slender. Body surrounded with black and yellow rings. Beneath yellowish white. Length 29 inches. *Tennessee.*

H. tigrinus. (Id. Ib. p. 189.) Smaller than preceding. Varied with black and ashen grey. A black horseshoe band runs through the eyes to the angle of each jaw. Length 16 inches. An jur? *Tennessee.*

Obs. Dr. Holbrook considers the two last as varieties of *H. platyrhinos.*

FAMILY CROTALIDÆ.

With poisonous movable fangs in the upper jaw; no other teeth in the upper jaw. A pit or fossa between the eye and nostril. Terrestrial.

Obs. In this State we have but two venomous serpents belonging to this family; and neither of them, except in the unsettled districts, are numerous.

GENUS TRIGONOCEPHALUS. *Oppel.*

Head large, triangular; covered with plates in front and on the vertex to behind the orbits, and beyond this with scales. A deep fosset between the eyes and nostrils. Body robust. Tail with plates, simple, unarmed; its plates occasionally divided.

THE COPPER-HEAD.

TRIGONOCEPHALUS CONTORTRIX.

PLATE IX. FIG. 18, a. SUMMIT OF THE HEAD. — (CABINET OF THE LYCEUM.)

Boa contortrix. LIN. Syst. Nat. 12 Ed. p. 373.
Angkistrodon mokeson. PAL. DE BEAUV. Am. Transact. Vol. 4, p. 381.
Cenchris contortrix. DAUD. Hist. Reptiles, Vol. 5, p. 358, pl. 50, fig. 25. (Head.)
Scytale cupreus. HARL. Med. and Phys. Res. p. 120.
Trigonocephalus contortrix. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 69, pl. 14, Ed. prima; Vol. 3, p. 39, pl. 8, Ed. secunda.

Characteristics. Copper-colored. Reddish brown blotches over the back, dilated on the sides. Series of irregular rounded black blotches on each side of the abdominal plates. Length two to three feet.

Description. Body robust and thick, and covered with oblong hexagonal carinate scales; those on the flanks larger and smooth. The posterior part of the head covered with smooth oval scales, which become carinate on the neck. Head large and very distinct from the neck, (in the plate, the head is represented disproportionately small,) and flattened above. Rostral plate emarginate beneath; the two pair of frontal plates four-sided, the posterior pair largest; supra-orbital plate oblong, obscurely triangular, prominent over the eyes; vertical plate subpentagonal, with an acute process directed backwards, and separating the occipital pair. Rostral plate large, triangular. The fosset or pit lies between the second labial and one of the anterior orbitals. Mouth very large, with long yellowish white venomous fangs in the upper jaw. Abdomen wide and flat. Tail short, one-eighth of the total length, tapering rather suddenly, and ending in a solid horny tip: the caudal plates irregularly bifid; and this division occurs either at the commencement, middle, or more rarely near the end of the tail. Ventral plate wide, subquadrate.

Color. Above copper-brown, which is much brighter on the sides. Across the back are about sixteen reddish brown bands, bordered with dusky, and becoming irregularly dilated on the flanks. These bands or blotches may be traced also over the tail, which is dusky towards the tip; between these bands, are irregularly interspersed rounded spots of the same color. Beneath, the abdominal plates pale cupreous, with a series of about thirty-five large, rounded or subquadrate dusky blotches on each side, and alternating with each other. They become irregular, and more numerous towards the tail; occasionally a few dusky spots are interposed between these series, on the centre of the abdominal plates. Head somewhat brighter colored than the upper part of the body.

Abdominal plates,..	145 – 155.	Total length,....	25·0 – 36·0.
Caudal ditto,.....	35 – 45.	Ditto of tail,....	3·5 – 4·5.

The Copper-head is a vicious reptile, and its bite is justly dreaded. Its poison is considered as deadly as that of a rattlesnake; and an instance is recorded, where a horse, struck by one of these reptiles, died in a few hours. It has various popular names in different districts; the most common of these are, in this State, *Copper-head*, *Red Adder* and *Dumb Rattlesnake*. In other districts, it is called *Copper-belly*, *Red Viper*, *Deaf Adder* and *Chunk-head*. Its motions are sluggish; and when approached, it assumes a threatening aspect, raising its head and throwing out its tongue. It chiefly occurs in pastures and low meadow grounds, feeding on field mice, frogs, and the smaller disabled birds. Many vegetable antidotes have been proposed against the venomous bite of this and the rattlesnake, but they all seem to depend mainly upon their being infused in large quantities of fluid. Nothing is more effectual than scarifying extensively, and cupping the wound. When the parts cannot be reached, after the application of a ligature, sucking the wound, if long continued, is commonly sufficient, together with copious draughts of oil, milk, or even warm water. Arsenic is said to have been used with great success. In a paper in the Medico-chirurgical Transactions, this remedy, combined with cathartic clysters, and frictions of oil of turpentine and spirits of ammonia on the wound, is said to have cured four very bad cases arising from the bite of a serpent. The arsenic was given in this form: Two drachms of Fowler's solution, with ten drops of laudanum and half an ounce of lime juice, in peppermint, formed a dose taken every half hour. From six to eight doses of the solution was found to be sufficient. The debility which ensued was counteracted by continuing the remedies in gradually diminished doses. The *Prenanthes serpentaria* or lion's-foot, the *Alisma plantago* or water plantain, and the *Hieraceum venenosum* or hawk-weed, have each had their vogue as remedies against this poison, but they can scarcely be depended on without the aid of the other remedies suggested above. An interesting series of experiments on the poison of the rattlesnake will be found in the Medical and Physical Researches of Dr. Harlan, to which we refer our reader.

Although the Copper-head is found in the western district of the State, yet I noticed them most numerous in the meadows of Columbia and Dutchess counties. Its geographical range extends from 45° north latitude to Florida. It does not seem to occur abundantly east of this

State; for I do not see it mentioned either in Hitchcock's Catalogue, or in the Report of Dr. Storer on the Reptiles of Massachusetts. Dr. Holbrook, however, has seen it in the neighborhood of Northampton, Massachusetts, and has received specimens from Vermont. It occurs in Ohio.

(*EXTRA-LIMITAL.*)

T. piscivorus. (Holbrook, Herpet. Vol. 3, pl. 7, of 2d Ed.) Dusky greenish brown tinged with yellow, with irregular black bands. Abdominal plates, 130; caudal, 40. Length one to two feet. *Toxicophis leucostomus* of Troost. *North-Carolina, Louisiana.*

T. atrofuscus. (Id. Vol. 3, pl. 9.) Scales smooth on the neck. Caudal plates: 25 subcaudal plates at the base, and 18 pairs of scales at the apex; black, varied with brown. Head black, bordered with grey; upper lip white. Abdominal plates, 133. Length two feet. *Tennessee.*

GENUS CROTALUS. *Linneus.*

Head large, triangular, rounded in front, and covered with plates only on its anterior part; vertex and occiput with scales. A deep pit or fosset between the eye and nostril. Upper jaw with poison fangs. Tail short and thick, ending in a rattle, which is a horny production of the epidermis. Caudal plates undivided.

Obs. This genus is peculiar to America.

THE NORTHERN RATTLESNAKE.

Crotalus durissus.

PLATE IX. FIG. 19. — (CABINET OF THE LYCEUM.)

Crotalus durissus. Lin. Syst. Nat. p. 372. Harlan, Med. and Phys. p. 132.
C. confluentis? Say, Long's Expedition, Vol. 1, p. 48.
Crotalus durissus. Holbrook, N. Am. Herpetology, Vol. 2, p. 81, pl. 17; and Vol. 3, p. 9, pl. 1, Ed. 2da.
The Banded Rattlesnake. Storer, Mass. Report, p. 233. Kirtland, Zoology of Ohio, p. 188.

Characteristics. Reddish brown or chesnut to black, with irregular rhomboidal black blotches. Abdominal plates, 173; caudal, 25. Length three feet.

Description. Body robust, and covered with elongate rhomboidal scales, distinctly carinate above, but less obviously so on the sides, although these latter are larger. Head large, triangular, obtusely pointed, flattened above. Rostral plate large, truncate above, triangular, with a quadrangular plate on each side; posterior to these a smaller plate, and in the suture between them are placed the nostrils. The superior orbital plates project strongly over the eye. A deep fosset or pit midway between the eye and nostrils, but on a lower plane. Throat with two very large plates. Neck small. Tail short, less than one-eighth of the total length.

Rattles varying in number, in general varying from five to twelve.* The *rattle*, as it is called, is composed of several horny enlargements loosely attached to each other, and resounding against each other when shaken.

Color. Usually yellowish brown, and occasionally bright chesnut red. I have seen some individuals in this State, of nearly a uniform brownish black. On the upper part of the head and neck, it is frequently of a lighter color, margined on each side with dusky. A series of black rhomboidal blotches, disposed in an angular form, extends along the back and over the sides; often a distinct reddish vertebral line. Caudal portion uniform dusky, and occasionally deep black. Beneath dull yellowish, with glossy reflections, and minutely and irregularly dotted and blotched with brownish black.

Abdominal plates,	170 – 177.	Total length,	36·0 – 48·0.
Caudal plates,	20 – 25.	Length of tail,	2·5 – 3·5.

As this species is found farther north than any other of the genus, I have ventured to designate it by the name of the *Northern Rattlesnake*, although it is found as far south as the Gulf of Mexico, and throughout the Western States, and to the base of the Rocky Mountains. Although furnished with such deadly weapons, the rattlesnake can scarcely be termed a vicious animal; for he rarely strikes, unless almost trodden upon. When suddenly disturbed, he throws himself into a coil, and warns the aggressor by rapidly vibrating his rattles; these can scarcely be heard beyond the distance of a few yards.† This is most usually the case, but they occasionally strike without the slightest warning. Some years since, I was at an Indian settlement in the western part of the State, when, as we passed through a thick undergrowth of bushes, one of the Indians was struck in this sudden manner; but as his legs were enveloped in thick leggings, the stroke was harmless. The other Indians immediately hunted down and killed the reptile. They assured me, that whenever a rattlesnake sprung his rattle, it was a sign that he himself was alarmed, and that in such cases they invariably spared his life. It is a popular but erroneous belief, that a rattle is added each year. This is controverted by Dr. Holbrook, who has known two rattles added in one year, and Dr. Bachman has observed four produced in the same period. The upper jaw is furnished with long curved acute and hollowed fangs, which are replaced by others in the rear when broken off. A poison bag, which occupies the whole length of the jaw beneath the skin, communicates with these fangs at their bases. At the moment the snake strikes, he ejects the venom forcibly into the

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* In the Columbian Magazine or Monthly Miscellany for November, 1786, is figured and described the tail of a rattlesnake, with an almost incredible number of rattles. "The common number of fibulæ seldom exceeds fourteen or fifteen in a rattle; but the one given (fig. 4) is certainly a very great curiosity, even to a person who has seen a great number of this genus of snakes. The fibulæ are forty-four in number. The snake from which this rattle was taken, was not, as might be expected, of a size proportionate to the prodigious length of its rattle, but rather a middling sized snake. It was killed some time in the summer of this year, at Fort Allen." The greatest number ever seen by Dr. Holbrook, as he has assured me in conversation, was twenty-one.

† At the commencement of the War of Independence, the naval flag of Massachusetts displayed a Pine Tree, at the root of which was a coiled Rattlesnake, with the words "Don't tread on me!" or sometimes "Caveant moniti!" Let those who are warned beware! This was rather more appropriate than the ornithological monster who brandishes arrows and olive branches on our present armorial bearings.

wound. In an instance of a very large rattlesnake from Florida (the *C. adamanteus*), which was irritated, he struck violently against the iron wire on the side of the cage, and ejected the venom to the distance of three feet. The absurd notion of fascination is entertained by few at the present day: it is alluded to under the article Copper-head.

The Rattlesnake is common in various parts of the State, and in the northern States generally appears to prefer rocky situations. They abound in Clinton, Essex and Warren counties, along the shores of Lakes Champlain and George. Some idea may be formed of their numbers in certain districts in this State, by the following extract from the Clarion newspaper published in Warren county: "Two men, in three days, killed eleven hundred and four "rattlesnakes on the east side of Tongue mountain in the town of Bolton. Some of the rep- "tiles were very large, carrying from fifteen to twenty rattles. They were killed for their "oil, or grease, which is said to be very valuable."

Although numerous in the rocky mountainous districts of this State, they are rare or entirely wanting in those elevated regions which give rise to the Moose, the Raquet and the Hudson rivers. They are found in the counties of Sullivan, Ulster, Orange and Greene. A few still linger in the swamps of Suffolk county.

It is a popular belief that hogs are particularly destructive to these reptiles. This may be true to a certain extent; but neither their bristly hide, nor their thick teguments, afford them perfect immunity from the stroke of this serpent. I was informed by a respectable farmer in Dutchess county, that he lost three hogs in one season by the poison either of the copper-head or rattlesnake. The more probable explanation is, that the rattlesnake gradually disappears, and is finally extirpated, before the progress of cultivation.

The *C. horridus*, which frequently appears in the list of our reptiles, is not found in North America.

(*EXTRA-LIMITAL.*)

C. adamanteus. (Holbrook, Herpet. Vol. 2, pl. 16; and Vol. 3, pl. 2, Ed. 2da.) Very large. Dusky brown, with rhomboidal dark spots margined with grey. Length six to eight feet. *Carolina, Florida.*

C. oregonus. (Id. Vol. 3, pl. 3.) A broad white bar between the orbits, and two others on each side of the head. Back with two white zigzag lines. Abdominal plates, 177; subcaudal, 22. *Oregon.*

Genus Crotalophorus, *Gray.* Head covered with plates above. Rattles few in number, and not much developed. Subcaudal plates mostly entire.

C. miliarius. (Holbrook, Vol. 2, pl. 15; and Vol. 3, pl. 4, Ed. 2da.) Small. Grey, with a dorsal yellowish stripe, on which is a series of large black spots margined with yellowish white. Length 12 – 14 inches. *Carolina, Michigan. Louisiana.*

C. tergeminus. (Id. Vol. 3, pl. 5, Ed. 2da.) Ash brown, with a triple row of brown spots bordered with lighter. Sides spotted with alternate fuscous series. Length two feet. Allied to *miliarius.* *Western Territories.*

C. kirtlandi. (Id. Vol. 3, pl. 6.) *Massasagua.* Black, varied slightly with brown. A series of light brown rings on the back, and vertical lines on the flanks. Abdominal plates, 152; caudal, 27, bifid 2. Length 27 inches. *Michigan.*

FAMILY ELAPSIDÆ.

With venomous fangs, and permanently fixed; other teeth in the upper maxillary, and on the palate. Head not distinct from the body. Jaws not dilatable. No fosset between the eye and nostril.

Genus ELAPS. *Schneider.* Head scarcely larger than the body; no fosset between the eye and nostril; upper jaw with a fixed and permanently erect poison fang. Resembles *Coluberidæ.*

E. fulvius. (HOLBROOK, Herpet. Vol. 2, pl. 18.) Red, encircled with broad black bands bordered with yellow. Abdominal plates, 212; caudal, 32. Length twenty inches. *Carolina, Louisiana, Upper Missouri.*

CLASS IV. AMPHIBIA.

MORE OR LESS DISTINCTLY VERTEBRATED. WITH COLD RED BLOOD. HEART UNILOCULAR, OR WITH ONE AURICLE AND ONE VENTRICLE. EXTREMITIES FOUR, TWO OR NONE; OCCASIONALLY DISAPPEARING WITH AGE. SKIN NAKED, DESTITUTE OF SCALES. RIBS SHORT OR WANTING. RESPIRATION BY GILLS OR LUNGS, OR BOTH CO-EXISTENT. FORM IN SOME FAMILIES UNDERGOES A COMPLETE METAMORPHOSIS. AQUATIC OR TERRESTRIAL. CARNIVOROUS. EGGS IMPREGNATED AFTER EXCLUSION.

The *Amphibia* or *Amphibians* have, until recently, been treated as an order of *Reptiles;* but they present so many and such important variations from the character assigned to that class, that modern naturalists have almost unanimously agreed to consider them a distinct class, forming a group allied on the one hand to the Reptiles by the *Cæcilidæ*, and on the other to the Fishes by the *Sirenidæ*.

As early as 1816, De Blainville published a system of classification, which he had publicly taught in his lectures for several years previous. In this he indicated the propriety of separating the animals under consideration from the Reptiles. Of these he made a class, which he designated as *Nudipellifères* or *Ichthyoïdes nuds*. This he divided into four orders: 1. *Batraciens*, Frogs; 2. *Pseudosauriens*, or Salamanders; 3. *Amphibiens*, as Proteus, Siren, &c.; 4. *Pseudophydiens*, as Cæcilia. This was afterwards modified and enlarged in his "Principes d'Anatomie Comparée," published in 1822, when he designated his third class under the name of *Subichthyens*.

The characters assigned to this class must be taken with some limitations. Some of the genera undergo no metamorphosis whatsoever, either in form or respiration; at least none has hitherto been observed. Nor is the phrase "unilocular heart" literally exact; for although the auricle is externally single, yet dissections have proved that internally it is in some genera separated into two distinct auricles.

The Amphibians present such a variety of changes, and such modifications of structure, as to have given rise to many systematic arrangements. From the various systems proposed, we select that of Mr. Bell, as detailed in his admirable work on the British Reptiles, with such modifications as are necessary to produce uniformity with the general plan of this Report.

FAMILY RANIDÆ.

Body short and broad. Feet (in the young) wanting; afterwards four, the hind ones long, formed for leaping and swimming. Tail (in the young) long, compressed; afterwards wanting. No ribs; vertebræ few. Tympanum open. Respiration at first aquatic by gills, afterwards atmospheric by lungs. Gills at first external, but withdrawn within the chest before the metamorphosis. Impregnation after the exclusion of the eggs.

This family corresponds with a part of the order *Caducibranchia* of Bonaparte, and entirely with the order *Anoura* of Bell. It also agrees with the family *Ecaudata* of Oppel, the order *Salicutia* of Merrem, and a part of the order *Mutabilia* of Gray.

GENUS RANA. *Linneus.*

Upper jaw with a row of minute teeth; a transverse interrupted row in the middle of the palate. Tongue large, fleshy, notched behind, where it is alone movable. No post-tympanal glands. Hind legs long, palmated; four toes before, five behind. YOUNG, *with elongated bodies, and gills; without feet, and with a long compressed tail.*

THE BULLFROG.

RANA PIPIENS.

PLATE XIX. FIG. 48.—(STATE COLLECTION.)

Rana pipiens. LIN. Syst. Nat. LATREILLE, Hist. Nat. Rept. Vol. 2, p. 153.
R. id. HARL. Med. & Phys. Res. p. 101.
R. scapularis, (young.) ID. Ib. p. 103.
R. mugiens. DUMER. & BIBRON, Vol. 8, p. 370.
R. pipiens. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 81, pl. 15; and Vol. 4, p. 77, pl. 18, 2d Ed. STORER, Mass. Rep. p. 235.

Characteristics. Large. Head green; body greenish olive, with dusky blotches; legs spotted or barred. Length 6 to 12 inches.

Description. Body robust, smooth. Head very large. Nostrils lateral, very small, midway between the snout and orbits. Eyes large and prominent. Tympanum large and rounded, resembling a scale attached to the side of the head. Mouth large, with numerous minute acute teeth in the upper jaw. Tongue large and fleshy. Fore feet short, robust, with four short toes; the one next to the exterior longest; all with small tubercles at the joints. Hind legs long, more then twice the length of the fore legs. Under surface of the thighs partly granulated. Toes largely webbed, with tubercles at the joints; the one next to the exterior, longest.

Color. Body dusky with a greenish hue, and varied with irregular darker blotches. Head green above; throat yellow or yellowish white; lower jaw white; upper jaw green. Pupil

of the eye black; irides green. Tympanum green, with an outer circle of brown. Abdomen yellowish white. Fore legs greenish brown above, with dusky spots occasionally assuming the form of transverse bars. Hind legs brownish or dusky green above, yellowish white beneath, with obscure irregular dusky bars, or spotted with the same.

Length of the body, ... 4·0 – 12·0.
Ditto of hind legs,..... 2·5 – 7·0.

The Bullfrog is one of the largest of the family in this State, and appears to be generally distributed throughout the Union. It is well known by its hoarse voice, compared by many to the roaring of a bull, and which is so loud as to be heard at a great distance. It is entirely aquatic, although it occasionally comes to land. In the adult state, it feeds on insects, crawfish, helices, and small fish. The Tadpole, on the other hand, appears to be exclusively herbivorous. I have noticed this species some distance below Montreal, and I think in the vicinity of Trois Rivières. With its southern limits I am unacquainted. It occurs in Ohio.

THE LARGE NORTHERN BULLFROG.

RANA HORICONENSIS.

PLATE XXII. FIG. 62.

Rana horiconensis. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 91, pl. 18; Vol. 4, p. 83, pl. 19, 2d Ed.

Characteristics. Dark olive, with irregular black blotches. A longitudinal cuticular fold on each side. Length three to four inches.

Description. Body very stout, with an elevated cuticular fold running from the orbits on the sides of the posterior extremities. Nostrils small, lateral, and placed nearer the snout than to the orbits. Eyes large and prominent. Tympanum large, circular. Fore legs robust, four-toed. Hind legs much longer, the posterior part of the thigh granulated; five-toed, and fully palmated.

Color. Body dark olive brown, varied with irregular black spots above; silvery white beneath. An indistinct bluish band extends from near the snout, under the tympanum, to the shoulders. Chin and throat white. Fore legs dusky above. Hind legs dark olive, with narrow dusky bars. Pupil black; iris golden, reticulated with black. Length 3·5.

For a knowledge of this species we are indebted to Dr. Holbrook, who obtained his specimens from Lake George in this State. The Indian name of that lake (*Horicon*), suggested the trivial name. I saw them in great numbers in the lakes emptying into the Raquet river, but until I met with Holbrook's description, had supposed them to be varieties of the preceding. To this it is closely allied in size, voice and habits; but its cuticular fold is a strong distinctive mark. Its note is more sonorous, and in a lower key. It is believed to be strictly a northern species. The *melanota* of Harlan, appears closely allied. Dr. Harlan, it would seem, never saw the species, and the author he cites is utterly unworthy of credit.

THE SPRING FROG.

RANA FONTINALIS.

PLATE XXI. FIG. 54, a.

Rana fontinalis. *Common Spring Frog.* LE CONTE, Ann. Lyc. Vol. 1, p. 282.
R. flavi-viridis, var. HARLAN, Am. Jour. Vol. 10; Acad. Sc. Vol. 5, p. 338.
R. id. HARLAN, Med. and Phys. Res. p. 103 and 220. SMITH, Hitchcock's Catologue, p. 14.
R. fontinalis. HOLBROOK, N. Am. Herp. Vol. 3, p. 85, pl. 16; and Vol. 4, p. 87, pl. 21 of 2d Ed. STORER, Mass. Rep. p. 237.

Characteristics. Bright green, with obsolete dark-colored spots on the flanks; throat yellow. Beneath white. Length 3 – 4 inches.

Description. Body robust. Snout somewhat obtusely pointed. Orbits very prominent. Tympanum large, suboval, with a central elevation. Skin smooth on the dorsal and abdominal surfaces, obsoletely granulated on the sides. On each side of the back is a strong cuticular fold, extending from the posterior part of the orbit, touching the upper margin of the tympanum, and reaching to the posterior part of the body.

Color. Brilliant green above, which also extends with a somewhat darker shade over the posterior parts of the body, and the outer parts of the extremities. Belly pearly white. Throat yellow, somewhat passing into orange. Tympanum chesnut or chocolate-brown, the central elevation green. Thighs obscurely barred with black, or in their place interrupted series of dusky spots. Buttocks and posterior part of the thighs mottled with black. Irides golden, with a bright yellow ring.

Length 3·0 – 4·0.

The Spring Frog is one of our commonest species, and is that usually eaten as a delicacy. It lives in the vicinity of clear pools and running streams, and leaps into them when disturbed. It feeds upon water insects, and such others as may approach its neighborhood. It is one of the earliest that appears in spring. In its geographical range it must be considered as a northern species, being found in all the northern and middle States. Dr. Holbrook informs me that it is not found south of Virginia.

THE MARSH FROG.

RANA PALUSTRIS.

PLATE XXII. FIG. 60. — (STATE COLLECTION.)

Rana palustris. LE CONTE, Ann. Lyc. Vol. 1, p. 282.
R. pardalis. HARLAN, Am. Jour. Vol. 10, p. 50.
R. palustris. ID. Ac. Sc. Vol. 5, p. 339; Med. and Phys. Res. p. 104 and 222.
R. id. HOLBROOK, N. Am. Herpetology, Vol. 1, p. 93, pl. 14; and Vol. 4, p. 95, pl. 23 of 2d Ed.
Pickerel Frog. STORER, Mass. Report, p. 238.

Characteristics. Four rows of dark quadrate spots on the back and sides. Under sides of the thighs yellow. Length three inches.

Description. Head short; snout obtusely rounded. Nostrils equidistant between the eyes and snout. Eyes large and prominent. Tympanum small, rounded and polished. Buttocks granulated. Joints of the toes with fleshy tubercles.

Color. This appears to vary considerably with age: In the young, the general color of the upper part of the body is frequently of a brilliant golden green; the adult is usually pale brown. The spots along the back vary with age from rufous brown to deep black; these are more or less of a quadrate form, and larger than the row on the sides, which are often rounded. The spots of the dorsal series become occasionally confluent, producing a dark longitudinal band on each side. A dusky line, more or less obvious, proceeds from the eye to the snout; other lines parallel with this on the sides of the head. A greenish or yellow longitudinal line proceeds from the orbit to the posterior part of the body on each side, separating the dorsal from the lateral series. Tympanum of the general color of the body. Beneath soiled white, or tinged with yellow, which increases in intensity towards the tail. Fore legs short, brownish, with dark subocellate spots. Posterior extremities yellow beneath, brown or rufous above, with twelve to thirteen black annular bands margined with lighter; these bands are more usually uniform dusky greenish or brown. Similar, but oblique bands or spots on the fore legs. Eyes black, with a golden lustrous ring.

Length 2·0 – 3·0.

This is one of our most beautiful frogs, and is remarkably active. It has a strong and disagreeable odor; and from being used as bait, it is called, in various districts, *Pickerel Frog*, and also *Tiger* and *Leopard Frog*. It occurs along salt marshes, and in wet meadows near ponds and streams. I observed it in the most elevated regions in the northern part of the State.

Its geographical range, along the coast, extends from Maine to Virginia. Westward, it has been noticed in Ohio.

THE SHAD FROG.

RANA HALECINA.

PLATE XX. FIG. 49. — (CABINET OF THE LYCEUM.)

Rana halecina, Kalm. DAUDIN, Hist. Rept. Vol. 8, p. 122.
Shad Frog. BARTRAM, Travels, p. 274.
R. halecina. HARLAN, Ac. Sciences, Vol. 5, p. 337; Med. and Phys. Res. p. 102, and p. 224.
R. id. HOLBROOK, Herpetology, Vol. 1, p. 89, pl. 13; and Vol. 4, p. 91, pl. 13, 2d Ed. STORER, Mass. Rep. p. 237.

Characteristics. Green, with dark brown ovate spots bordered with yellow; beneath yellowish white. Length three to four inches.

Description. Head small, obtusely rounded in front. Eyes prominent. Upper part of the body roughened by several cuticular folds; posterior part of the thighs granulated. Tympanum large, plane, circular. Toes palmated. Fingers distinct; the thumb of the male with a distinct tubercle. Posterior extremities scarcely twice the length of the head and body; the fourth toe exceedingly long.

Color. Brassy or bronze green above. Orbits above, with an oval black spot. On the dorsal surface, two series of large irregular roundish dark olive spots, margined with yellow; these spots are occasionally confluent. A bronzed or yellow stripe on each side, proceeds from the eye to the posterior extremity; another yellow stripe extends from the eye to the angle of the mouth. The thighs and legs with dark olive oblong transverse patches, resembling bands. A few oblique dark oblong bars on the fore legs. Tympanum bronzed; yellowish in the centre. Beneath silvery, becoming tinged with yellow on the abdomen. Eyes black, with a golden ring.

Length, 3·0 – 4·0.

This beautiful species is extensively distributed over the whole Union. It abounds in moist places, and feeds chiefly on insects. From its simultaneous appearance in the spring with our common Shad (*A. sapidissima*), it is frequently called *Shad Frog*. In Massachusetts, they are better known under the name of *Leopard Frogs*. The Swedish colonists named them *Sill-hoppetosser*, or *Herring-hoppers*, from their appearance at the commencement of the herring season; and this, we presume, suggested the latin trivial name.

THE WOOD FROG.

RANA SYLVATICA.

PLATE XXI. FIG. 54. ADULT. — PLATE XX. FIG. 50. YOUNG. — (STATE COLLECTION.)

Rana sylvatica. LE CONTE, Ann. Lyceum, N. Y. Vol. 1, p. 282.
R. pensylvanica. HARLAN, Am. Jour. Vol. 10, p. 60.
R. sylvatica. ID. Med. and Phys. Res. p. 221.
R. id. HOLBROOK, N. Am. Herp. Vol. 1, p. 95, pl. 15; and Vol. 4, p. 99, pl. 24, 2d Ed. STORER, Mass. Rep. p. 239.
Wood Frog, R. Sylvatica. KIRTLAND, Zoology of Ohio, p. 190.

Characteristics. Reddish brown; a dark dilated stripe from the snout through the eye, and including the tympanum. *Young*, olive brown or green. Length two and a half inches.

Description. Body slender. Head small; nose obtusely rounded. Eyes large and prominent; tympanum small, circular. Thighs granulated behind. Posterior extremities twice the length of the head and body, palmated.

Color. Reddish brown above, resembling in color a withered leaf; this color is bounded on each side by a yellow and often interrupted narrow line from the orbits to the posterior extremity of the body. Flanks mottled with greenish and yellow. A dark brown band proceeds from the snout, and dilating backwards, includes half the eye and all the tympanum; this band is bordered below with a light yellowish line. Fore legs reddish brown, with obscure darker blotches. Hind legs of a similar color above, with two or more distinct transverse dark bands; beneath soiled white. Under side of the extremities light brown.

Young. Olive brown, verging on green above; the lateral stripe yellow, margined with interrupted black lines; the ocular stripe black, bordered beneath with white. Thighs, legs and tarsus barred with black; palms reddish. Beneath pure white.

Length 2·5.

This small species can at once be recognized in the woods by its amazing and quickly repeated leaps, which render its capture difficult.

It occurs from Massachusetts to Virginia, and is smaller than the Marsh Frog. It is said by some authors to be confined to the Atlantic States in its range; but we learn from Dr. Kirtland, that they are so abundant in the woods in Ohio, that it is almost impossible to move without stepping on them. It is allied to the *R. temporaria* of Europe, but is smaller, with the head less pointed and tympanum smaller.

(*EXTRA-LIMITAL.*)

R. clamitans. (Holbrook, Vol. 3, pl. 17; and Vol. 4, pl. 20, 2d Ed.) Slender. Reddish brown above, darker behind, silvery white beneath; upper jaw green. Lateral cuticular folds. Length three inches. *Carolina, Georgia.*

Genus Cystignathus, *Wagler.* A sub-gular vocal vesicle, communicating with the mouth on each side of the tongue. Fingers and toes all distinct. Tympanum very small.

C. ornatus. (Holbrook, Vol. 1, pl. 16; and Vol. 4, pl. 25, 2d Ed.) Small. Dove-colored above, with oblong spots of dark brown, margined with yellow. Toes not palmate; the two outer united at the base. *South Carolina.*

C. nigritus. (Id. Vol. 3, pl. 19; and Vol. 4, pl. 26, 2d Ed.) Small. Olive brown; an interrupted black vertebral line, with blackish blotches along the sides; legs barred; upper lip white. Length 1½ inches. *Carolina, Georgia.*

Genus Engystoma. *Fitzinger.* Body oval, and covered with a smooth skin. Head small, pointed; mouth minute. Tongue long, only movable behind. Jaws and palate without teeth. No parotids; tympanum concealed. Fore legs with four, hind legs with five toes not palmated.

Obs. The animals of this genus bear a general resemblance to the Frog. Only one species has been as yet observed in the United States. Dr. Holbrook thinks it possible that a species may be found in this State, for he has heard its peculiar noise in the neighorhood of New-York; and Major Le Conte informs me that he has seen a species of Engystoma, said to have been found in a sandy district of this State.

E. carolinense. Holbrook, Vol. 1, pl. 11.) Chesnut above, and thickly mottled with blackish specks beneath. *South Carolina.*

GENUS SCAPHIOPUS. *Holbrook.*

Body short, thick swollen. Head short. Minute teeth in the upper jaw and on the palate. A small parotid gland behind the ear, from which a watery fluid can be pressed. Posterior extremities short, stout and muscular. Legs shorter than the thigh. A spade-like horny process occupies the position of a sixth toe, and is used by the animal in excavating.

HERMIT SPADE-FOOT.

SCAPHIOPUS SOLITARIUS.

PLATE XIX. FIG. 47. — (STATE COLLECTION.)

Scaphiopus solitarius. HOLBROOK, N. Am. Herpetology, Vol. 1, p. 85, pl. 12.
Rana holbrookii. HARLAN, Med. and Phys. Researches, p. 105.

Characteristics. Ash grey, with two yellow curved lines from the eyes, dilated, and subsequently united at the vent. Length two inches.

Description. Head short, obtuse. Nostrils subterminal. Eyes very large, and placed in very prominent orbits. Tympanum small, and behind it a small parotid gland, which upon pressure exudes an acrid fluid. Fore feet long, four-toed; posterior with five toes, and a long black horny process on the metatarsus.

Color. Back ashen grey, passing into dark brown, with dark brownish and reddish tubercles on the flanks. Irides golden; and in a modified light, the iris is seen divided into four parts by a vertical and horizontal line, giving a lozenge shape to the black pupil. Tympanum dull yellow. From the eye on each side there runs a yellowish line, punctate with black, approaching each other, then diverging in a curved direction, and finally uniting on the rump; the position of these two lines resembles the outline of the antique lyre. A bar of a similar color, but interrupted on the flanks. Coccyx with a broad longitudinal yellow stripe. Upper surfaces of the extremities brown, with yellowish blotches. Body beneath greyish white.

Length, 2·0. Breadth of the head, 0·7.

This singular animal, whose structure is so remarkable as to have required a separate genus, was first detected by our eminent Herpetologist, Dr. HOLBROOK. With the teeth of a Frog, and parotid glands of a Toad, its natural place is between these two genera. It was first detected in South-Carolina, and subsequently found in Tennessee, and its geographical range was considered to be quite restricted. We have now the pleasure to include it in the Fauna of New-York. Specimens of this animal were found by Mr. Hill, in a garden near Clarkstown, Rockland county. It lives in small holes, in damp earth, a few inches below the surface, which it excavates with great ease by means of its spade-like processes. In these holes it lies in wait for such insects as may approach, and I suspect can spring forth to seize whatever may be passing incautiously near its hiding place. I remarked, at least in those which I had alive, that it leaped with great apparent ease to a considerable distance. To

judge from those in my possession, although completely identical with the *solitarius*, I should be disposed to believe that our northern variety is less brilliant in its markings, and its general color is of a more grave and sombre hue. Dr. Pickering, I learn, has recently seen it in the neighborhood of Salem, where they appear in great numbers, at distant periods, after rains of long continuance.

GENUS BUFO. *Laurenti.*

Body thick swollen, covered with warts or papillæ. Jaws without teeth. Behind the ear a large glandular tumor, having visible pores. Head short. Posterior extremities but slightly elongated.

THE COMMON AMERICAN TOAD.

BUFO AMERICANUS.

PLATE XIX. FIG. 46. YOUNG. — PLATE XX. FIG. 52. ADULT.

Bufo americanus. LE CONTE, Cat. in McMurtrie's Trans. of Cuvier's Règne Animal.
B. musicus. HARLAN, Ac. Nat. Sc. Vol. 5, p. 344 (excl. syn.); Med. and Phys. Res. p. 109.
B. americanus. HOLBROOK, N. Am. Herpetology, Vol. 1. p. 75, pl. 9; and Vol. 5, pl. 4, 2d Ed.
The Common Toad. STORER, Massachusetts Report, p. 244. KIRTLAND, Zoology of Ohio, p. 168.

Characteristics. Body moderately verrucose. Post-tympanal gland long and narrow. Posterior toes semipalmate. Greyish mottled with dusky, and dark bars across the feet. Length three inches.

Description. Body corpulent, covered with numerous reddish warts irregularly distributed; granular beneath. Head short, but wide; channelled above by the prominence of the superciliary ridges. Eyes large and prominent; the eyelids tuberculated. Nostrils small, rounded, and nearer to the nose than the eyes. Parotids prominent, tuberculated, reniform. Fore feet with four short free toes. Hind feet with its five toes connected at their bases. Inner toe shortest; thence gradually increasing in length to the penultimate, or second from the outer toe: a large tubercle beneath.

Color. This is subject to many variations, dependent upon age, season, scanty or abundant supply of food, and even varies at the will of the animal. It may be described generally as grey brown or ash, with irregular but well defined dark blotches, and a pale ash dorsal stripe extending from between the eyes to the posterior part of the body. Eyes black; irides varied with yellow and black. On the extremities are dark brown bars, extending over the toes. Beneath soiled white. *Young*, at first dull reddish brown, but by the end of the season become mottled and barred as in the figure. There is a variety occasionally found of a bright red or brick-dust color, but which in other respects resembles this species.

Length 2 – 3 inches.

The habits of this animal are somewhat nocturnal; coming out of its hole in the dusk of the evening, and hopping about in search of food. I have also noticed it during the day time, crouched in a shallow cavity, with its body so much depressed as to appear nearly orbicular, and apparently on the look-out for its prey. Although according to our notions of beauty he is considered to be a disgusting looking animal, yet we are not to overlook his value in diminishing the number of noxious insects; and I have been assured that his flesh is as delicate an article of food, as the frog itself. It is a timid, inoffensive, and entirely harmless animal, and has even been domesticated. The popular belief in its poisonous properties, is unfounded. There is, it is true, an acrid secretion from the follicles of the skin, which may serve as a protection against some of its enemies. Dr. Davy supposes that it may be excrementitious, carrying off a portion of carbon from the blood, and thus be auxiliary to the functions of the lungs. They live upon insects, earthworms, etc., which they always seize when in motion, refusing to touch any dead food. In their turn, they are preyed upon by the larger reptiles, especially by the two striped snakes and the other species. Like the frog, its young are developed in water, and pass through the tadpole state; and it is also furnished with a sac for holding the water obtained through the cutaneous absorbents. It sheds its skin at certain intervals, and according to the observations of Mr. Bell, swallows it as soon as it is detached.

Dr. Holbrook informs me that he has seen this species as far north as the River Saco, New-Hampshire, and probably it will be found still farther. Its southern and western limits appear to be defined by the hilly regions, as contradistinguished from the alluvial lands bordering on the Atlantic. Kirtland notices it in Ohio.

(*EXTRA-LIMITAL.*)

B. lentiginosus. (Holbrook, Vol. 1, pl. 9; and Vol. 4, pl. 1, 2d Ed.) Upper jaw emarginate; lower with a process in front. Head large; superciliary ridge much elevated. Rufous brown. Length three inches. *Southern States.*

B. erythronotus. (Id. Vol. 3, pl. 21; and Vol. 5, pl. 2, 2d Ed.) Brickdust color above; yellowish white beneath. Head short, rather pointed. Length one and a half inches. *South Carolina.*

B. quercicus. (Id. Vol. 5, pl. 3, 2d Ed.) Very small. Head short, pointed; superciliary orbits slightly elevated. Body very flat, rounded at the flanks. A yellowish vertebral line. Length 0·75. *Carolinas.*

B. cognatus. (Id. Vol. 5, pl. 5.) Channelled posteriorly between the orbits, but effaced in front. A vertebral line, and oblique lateral yellowish lines. Foot with a spade-like process. Length three inches. *Upper Missouri.*

GENUS HYLODES. *Fitzinger.*

Teeth in the upper maxillary, and palatines. A tympanum. Extremities slender. Tips of the fingers and toes terminating in slightly developed tubercles. Mouth with a large subcordiform tongue. No bony sternum.

Obs. This genus comprises several small species, and is intermediate between Rana and Hyla, partaking of the habits of both.

PICKERING'S HYLODES.

HYLODES PICKERINGI.

PLATE XX. FIG. 51.

Hylodes pickeringi. HOLBROOK, N. Am. Herpetology, Vol. 4, p. 135, pl. 34.
H. id. Essex Nat. Hist. Society, Vol. 1.
Pickering's Hylodes. STORER, Report on the Reptiles of Massachusetts, p. 240.

Characteristics. Reddish brown or blackish brown; two angular dusky lines above; hind legs barred with dusky. Length one inch.

Description. Body somewhat ventricose, with its surface slightly granulate. Head triangular, obtusely pointed. Granulated beneath on the belly and thighs. Fore legs half the length of the head and body. Thigh and tibia slightly exceeding the tarsus and toes, and equalling in length the head and body. Tongue fleshy, retractile. A row of exceedingly minute teeth in the upper jaw, and similar ones in two rounded patches in the middle of the palate.

Color. This varies apparently at the will of the animal. One which I kept for several days, presented constantly the following appearances: Color of the head, body and legs above a light reddish brown, tinged with yellowish on the side; upper lip yellowish white; a dark triangular spot on the back part of the head. Irides golden; pupil black. On the anterior part of the back, two angular dusky lines *en chevron*, touching at their apices, and forming the figure of a cross; posterior to this, another angular mark across the back; a dusky blotch on the posterior part of the body; a dark lateral stripe on the side. Thighs and legs with broad dusky bands; a dusky longitudinal line on the fore and hind legs, separating the two colors above and beneath. Beneath dull whitish, with numerous black dots sprinkled on the yellowish throat. At other times the general color is a uniform dark brown, with the markings on the upper part of the body as described above, deep black.

Length of head and body, ... 1·0.
To the ends of the toes, ... 3·0.

This species is common in the neighborhood of New-York, and is frequently found on indian corn, grape vines, and also in green houses, under the leaves of plants during the heats of

summer: feeds on small flies. Its present known geographical range is from Massachusetts to Pennsylvania.

THE CRICKET HYLODES.

HYLODES GRYLLUS.

PLATE XXII. FIG. 61.—(CABINET OF THE LYCEUM.)

Rana gryllus. LE CONTE, Ann. Lyc. Nat. History, Vol. 1, p. 282.
R. id. HARLAN, Acad. Nat. Sc. Vol. 5, p. 340.
R. dorsalis. ID. Med. and Phys. Res. p. 105.
Acrys gryllus. DUM. et BIBRON, Hist. Nat. Rept. Vol. 8, p. 507.
Hyla gryllus. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 75, pl. 13.
Hylodes gryllus. ID. Ib. Vol. 4, p. 131, pl. 33, 2d Ed.

Characteristics. Cinereous, with a green or red vertebral line, and two or three black blotches bordered with white. Head green above. Length one and a half inches.

Description. Body slender. Head somewhat elongated. Eyes large and prominent, the supra-orbital ridge being much elevated. Nostrils lateral, midway between the orbits and snout. Fore feet small, with slender fingers, which are slightly enlarged at their tips. Hind legs nearly twice the length of the body, with five long slender palmated toes.

Color. Head greenish above, with a black triangular spot between the orbits. Irides golden above, blackish beneath; pupil black. Body dusky above, with a greenish or reddish line extending backward to the vent; this becomes bifurcated in front, a branch being directed to each orbit. The blotches on the sides are dusky or blackish, obsoletely bordered with white. Thighs yellowish behind, with a few semi-bars of brown. Beneath silvery white.

Length 1·0 – 1·2.

This species is known under the names of *Peeper* and *Cricket Frog*, in New-York. At the South, it is called *Savannah Cricket*. It is very lively and noisy, frequenting moist wooded places and the borders of ponds, and is often seen on aquatic plants. It was first distinctly indicated by Major Le Conte, who regarded it as a true Frog. I have followed Dr. Holbrook, in arranging it under Hylodes. It is never found on trees, and cannot adhere to the under side of smooth surfaces.

(*EXTRA-LIMITAL.*)

H. ocularis. (HOLBROOK, Vol. 3, pl. 14; and Vol. 4, pl. 35, 2d Ed.) Very small. Reddish brown; a black band from near the end of the snout, runs through the eyes and along the flanks. Length three quarters of an inch. *South Carolina, Georgia.*

GENUS HYLA. *Laurenti.*

Body somewhat tapering. Teeth in the upper jaw and palate. A tympanum. No parotids. Fingers long, and with the toes terminating in rounded viscous pellets. Males with a vocal vesicle.

Obs. The skin above, in most of the American species, is smooth.

THE NORTHERN TREE-TOAD.

HYLA VERSICOLOR.

PLATE XXI. FIG. 53, A.—(STATE COLLECTION.)

Hyla versicolor. LE CONTE, Ann. Lyc. Nat. Hist. Vol. 1, p. 281.
H. id. HARLAN, Acad. Nat. Sc. Vol. 5, p. 343. ID. Med. and Phys. Res. p. 108.
H. id. HOLBROOK, N. Am. Herp. Vol. 1, pl. 17; and Vol. 4, p. 115, pl. 28, 2d Ed. STORER, Mass. Rep. p. 241.

Characteristics. Broad. Leg shorter than the thigh. Grey. Small warts above; granulate beneath. Posterior parts of the thighs bright yellow. Length two inches.

Description. Body robust and broad, covered with numerous small warts. Head broad, and terminating in a blunt snout. Fore feet with four toes terminating in rounded pellets; the internal toe shortest. Hind feet with five toes terminating in the same manner, but semi-palmate. Under side of the body and thighs granulate. Eyes large and prominent.

Color. This varies, as is well known, at the will of the animal, from grey to green. The more usual color is ash above, with a dusky acute-angled cross made up of irregular blotches, which also extend over the sides of the body and across the extremities. Eyes with black pupils and golden irides. Beneath whitish; the chin speckled with cinereous. Legs beneath yellowish; posterior part of the thighs yellow, barred with black.

Length 2·0.

This is universally distributed through the State, and is a northern species. The surface is covered with a viscid acrid secretion, which, as in the case of the common toad, has led to the popular belief in its being poisonous. It lives almost exclusively on trees; and during damp weather, it is particularly clamorous. It feeds on insects. I have been assured by many credible persons that it possesses ventriloquial powers in no inconsiderable degree, and often deceives the most attentive observers. This, together with its faculty of assimilating its color with that of the tree on which it rests, renders its capture very difficult. Extends from Maine to Virginia, and is also found in Tennessee and Ohio.

THE SQUIRREL TREE-TOAD.

HYLA SQUIRELLA.

PLATE XXI. FIG. 53. — (CABINET OF THE LYCEUM.)

Hyla squirella. BOSC, Nouv. Dict. Sc. Naturelles, Vol. 29, p. 543.
Rainette squirelle. DAUDIN, Hist. Nat. Rept. Vol. 8, p. 34, pl. 93, fig. 2.
H. squirella. LE CONTE, Ann. Lyc. Vol. 1, p. 279. HARLAN, Med. and Phys. Res. p. 109.
H. id. HOLBROOK, N. Am. Herpetology, Vol. 1, p. 105, pl. 18.

Characteristics. Brown or ash. A dusky band from the nostrils to the eyes. The white of the upper lip reaches almost to the insertion of the fore legs. Length one inch and a quarter.

Description. Body symmetrical, somewhat elongated. Skin smooth, or at the most with slightly elevated papillæ. Head conic. Snout acute; its sides vertical, and giving it a pyramidal form. Orbits somewhat elevated. Anterior feet short, four-toed. Hind legs long, five-toed, semi-palmate; all with rounded pellets at their extremities.

Color. Brownish or light ash above, changing to light green; blotched, and lined with dusky stripes on the surface of the body in a very irregular manner. On the anterior part, more usually abbreviated longitudinal lines, and unequal sized blotches on its posterior portions. A dusky stripe extends from the nostrils to the eyes; occasionally a large triangular dusky blotch between and behind the eyes. Thighs and legs barred with dusky. Beneath whitish.

I have met with this species in the neighborhood of New-York, and supposed it at first to be distinct from the southern *squirella*. From a careful comparison of our specimens with those in the Cabinet of the Lyceum deposited by Major Le Conte, the only observable distinction was in the smaller size of the northern animal. After a rigorous comparison, Major Le Conte decided it to be identical with the southern species. I am under obligations to him for the drawing which illustrates this pretty little tree-toad.

According to Major Le Conte, it inhabits under logs and bark of decaying trees.

While these pages are passing through the press, Dr. Holbrook is engaged in publishing a second edition of his Herpetology. He is still of the opinion that the *squirella* is exclusively a southern species.

(*EXTRA-LIMITAL.*)

H. femoralis. (HOLBROOK, Vol. 4, pl. 31.) Dark ash, with a few dusky blotches between the eyes; a black line from the eyes to the hind legs, and another to those in front. Length $1\frac{1}{2}$ inches. *Carolina and Georgia.*

H. delitescens. (ID. Vol. 4, pl. 32.) Ash, irregularly speckled with darker; lips whitish, speckled with brown; vent varied with cinereous. Length $1\frac{3}{4}$ inches. *Georgia and South-Carolina.*

H. viridis. (ID. Vol. 3, pl. 20; and Vol. 4, pl. 29 of 2d Ed.) Bright green, with a yellow line on each side from the snout to the posterior extremities. Length $1\frac{3}{4}$ inches. *From Lat. 30° N. to Mississippi.*

FAMILY SALAMANDRIDÆ.

Body long and slender. Feet always four. Tail long, rounded or compressed, persistent. Ribs very short. Vertebræ numerous and movable. Respiration, at first aquatic by external gills, which are never concealed in the chest; afterwards atmospheric by lungs. Tympanum concealed.

Obs. This family corresponds with the order *Urodela* of Bell. It is a very natural family, and is in this country prolific in species. We separate it into two genera.

GENUS SALAMANDRA. *Brongniart, Holbrook.*

Jaws with numerous small teeth, and two rows of similar teeth in the palate. Tongue short thick, enlarged above, free, attached by a very slender root in the centre. Without a third eyelid. Ribs rudimentary; no sternum. Pelvis suspended by ligaments. Tail either cylindrical or compressed towards the tip.

These are the Land Salamanders, although found occasionally in water.

THE YELLOW-BELLIED SALAMANDER.

SALAMANDRA SYMMETRICA.

PLATE XV. FIG. 33.

Salamandra stellio. Am. Jour. Sc. Vol. 1, p. 264.
S. symmetrica. Harlan, Ac. Sc. Vol. 5, p. 158. Med. and Phys. Res. p. 98.
S. id. Holbrook, N. Am. Herp. Vol. 2, p. 59, pl. 11. Storer, Mass. Rep. p, 246.

Characteristics. Reddish brown above, with a series of crimson spots on the sides; beneath reddish orange. Tail longer than the body, small compressed. Length three inches.

Description. Body cylindrical, and covered with a rough cuticle. Head short, obtusely pointed. Fore feet slender, with four toes; hind legs more robust, with five toes. Tail slender, sub-cylindrical at base, then compressed, and terminating in a point.

Color. Upper part of the head, body and tail, reddish brown; this color extends over the upper part of the extremities, and surrounds the lower part of the tail. On each side of the body a series of brilliant vermillion spots, each bordered with black; these spots vary in number from three to five, and even seven have been observed on each side. Throat and abdomen orange, with minute black dots extending to the end of the tail.

Total length,	2·9.
Length of the head and body,	2·0.
Tail measured from the vent,	0·9.

The Yellow-bellied Salamander is extensively distributed throughout the Union, from Maine to Florida, and in Ohio westwardly. It is closely allied by its markings with the following species, from which it was first accurately distinguished by Dr. Harlan. It is frequently found under stones and decayed wood.

THE VIOLET-COLORED SALAMANDER.

SALAMANDRA SUBVIOLACEA.

PLATE XVI. FIG. 36. — (CABINET OF THE LYCEUM.)

Salamandra venenosa. BARTON, apud DAUD. Hist. Rept. Vol. 8, p. 229.
S. subviolacea. ID. Trans. Am. Phil. Society, Vol. 6, p. 112, pl. 4, fig. 6.
S. id. HARLAN, Acad. Nat. Sc. Vol. 5, p. 327; Med. and Phys. Res. p. 93.
S. id. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 105, pl. 24. STORER, Mass. Rep. p. 247.

Characteristics. Bluish black, with round yellow spots; beneath immaculate. Tail cylindrical, compressed towards the tip. Length 6 – 7 inches.

Description. Body robust, tapering regularly to the end of the tail. Head large; snout rounded. Eyes small, but prominent. A strong cervical fold. Fore feet slender, four-toed; hind feet more robust, five-toed. Tail confounded with the body, cylindrical at base, then becomes compressed, and tapers to a point.

Color. Bluish-black or purplish, with large round subequal bright-yellow spots irregularly distributed over the upper part of the head, body and tail, and occasionally on the upper parts of the legs; these spots sometimes assume somewhat the appearance of two regular series on each side of the vertebral line. A small round spot usually over each eye. Beneath lighter, sprinkled with numerous white points extending beneath the tail.

Length 5·0 – 7·0.

This species extends along the Atlantic from Maine to Maryland, and has likewise been noticed in the western States. Of the two names proposed by the same author, we are at liberty to reject the name which conveys a false idea, and to adopt that which the author applied to his more complete and detailed description. It appears to be nocturnal, and is found under rocks, stones and decaying trees; and in spite of one of its names, is entirely harmless.

THE RED-BACKED SALAMANDER.

SALAMANDRA ERYTHRONOTA.

PLATE XVI. FIG. 38. — (STATE COLLECTION.)

Salamandra erythronota et *cinerea*. GREEN, Journ. Acad. Nat. Sc. Vol. 1, p. 356.
S. erythronota. HARLAN, Med. and Phys. Researches, p. 95.
S. cinerea? ID. Ib.
S. erythronota. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 113, pl. 27.
The Red-backed Salamander. STORER, Mass. Report, p. 245.

Characteristics. Small. A distinct vertebral stripe, varying with age from scarlet to reddish brown. Length 2 – 3 inches.

Description. Body slender, cylindrical. Tail cylindrical, tapering towards the extremity, where it becomes compressed, more particularly in the younger individuals, and pointed. Snout obtusely rounded. Eyes small, moderately prominent. Nostrils lateral, near the snout. Cervical fold indistinct. Legs feeble; the fourth toe on the fore foot rudimentary.

Color. Head above brownish; chin and throat whitish, (according to Green, with a few dots of crimson.) Sides dull white, thickly punctate with brown, and lustrous. Eyes black. A broad vertebral stripe extending from the snout (occasionally from the occiput) towards the end of the tail; this stripe is of a deep or lighter red color, varying with age. In very young individuals 0·8 long, this stripe is of a brilliant scarlet or crimson.

Total length, 3·0 – 3·5.

Prof. Green, after a careful revision and comparison of his *cinerea* and *erythronota*, came to the conclusion that the former was an aged individual of the latter, in which the dorsal stripe had become obsolete.

The Red-backed Salamander is a very numerous and widely distributed species. It is among the first which appears in the spring, and I have seen it as early as the middle of April. It runs with great rapidity among the leaves, in moist wooded districts, and conceals itself under stones and decayed trees. It has been noticed by Dr. Blanding at Camden, South Carolina, and by Mr. Say at Louisville, Kentucky. The most northerly limit of this species observed by me, was on the islands of the Saranac lake.

THE PAINTED SALAMANDER.

SALAMANDRA PICTA.

Salmandra picta. HARLAN, Journ. Acad. Nat. Sc. Vol. 5, p. 136.
S. intermixta. GREEN, Macl. Lyceum, Vol. 1, (fide Harlan.)
S. picta. HARLAN, Med. and Phys. Researches, p. 98 and 177. STORER, Mass. Rep. p. 251.

Characteristics. Dark slate or blackish; yellowish or orange beneath. Tail abruptly compressed towards the tip, slightly shorter than the body. Length four inches.

Description. Head large, rather flat; occiput broad, slightly protuberant; snout obtuse, rounded posteriorly; rictus of the mouth wide, extending to the eyes. A cervical fold. Legs short, strong, thick. Tail sub-quadrangular for the first two-thirds; the remaining portion abruptly compressed, pointed, with the edges carinate.

Color. Blackish, or dark slate above; inferior portion of the body obsoletely punctured with dark spots, more evident on the sides. Legs externally of the color of the back.

Length, 4·5.

Inhabits shallow streams. I am indebted to Dr. Harlan for the above description. It is introduced here, as it has been seen both in Massachusetts and Pennsylvania, and of course may be presumed to inhabit this State.

THE SALMON-COLORED SALAMANDER.

SALAMANDRA SALMONEA.

PLATE XVI. FIG. 39.—(STATE COLLECTION.)

Salamandra salmonea. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 101, pl. 22.
The Salmon-colored Salamander. STORER, Mass. Report, p. 248.

Characteristics. Reddish brown; sides salmon-colored. A bright salmon-colored line from the eye to the snout. Length six to seven inches.

Description, from a specimen preserved in spirits. Head flattened above, with the eyes prominent and far apart. Teeth exceedingly numerous, acute and recurved in both jaws. Tongue doubled back in the mouth, with a fold. Gular fold large, distinct. A vertebral furrow, extending from behind the eyes to a point opposite the vent. Tail compressed, distinctly carinate above, moderately so beneath.

Color, from the description given by Dr. Storer, the original describer of this species. Whole upper part of the body, head, legs and tail, yellowish brown; sides of a salmon-color. The entire surface of all the upper portion, as well as the sides, spotted with irregular greyish markings, which are more obvious on the lighter colored sides. Beneath, head and body white; light salmon-color beneath the tail. From the edge of the upper lip, just exterior to the nostrils, arises a salmon-colored line, about a fourth of a line in width, which runs back to the inner angle of the eye, and passing up over the eye, loses itself upon the middle of the back part.

Total length,	5·7.	Length of fore feet,	0·5.
Length of head and body,	3·4.	Ditto of the hind feet,	0·7.
Ditto of the tail,	2·3.		

This beautifully colored Salamander was obligingly communicated to me by Prof. Emmons, to whom I am under many similar obligations. All its beautiful tints disappear in spirits, when it presents the following colors: Above mottled grey and brown, the former predomi-

nating. On the flanks beneath, dull yellowish, punctate with brown. Sides of the tail similar to the dorsal surface. Chin whitish; the lower lip dotted with brown; a light colored stripe from the nostrils to each eye.

I have been particular in noting these appearances, as it may serve as a guide to closet naturalists, and exhibits the futility of creating species from cabinet specimens. I had fallen into this error myself in relation to the species under consideration; and previous to the publication of Dr. Storer's description, had entered it in my list of species as new, with an appropriate name. I am indebted to my friend Dr. Holbrook for correcting my description.

Dr. Emmons found it under a stone at Newcomb, Essex county, in this State. It has been seen in Massachusetts and Vermont.

THE BLOTCHED SALAMANDER.

SALAMANDRA FASCIATA.

PLATE XVII. FIG. 40.—(COLLECTION OF MAJOR LE CONTE.)

Salamandra fasciata. GREEN, Journ. Acad. Nat. Sciences, Vol. 1, p. 350.
S. *id.* HARLAN, Medical and Phys. Researches, p. 94.
S. *id.* HOLBROOK, N. Am. Herpet. Vol. 4, p. 103, pl. 23. STORER, Mass. Rep. p. 247.

Characteristics. Grey, with large bluish black blotches on the upper part of the body and tail; beneath deep blue. Length five inches.

Description. Body robust. Head moderately broad, short, thick and rounded. Mouth large. Eyes large and prominent. Nostrils lateral, and near the snout. Legs robust; anterior four-toed, the posterior five-toed and longer; all with separate toes. Tail shorter than the head and body, subcompressed, ending in rather an obtuse point.

Color. Grey above, with irregular transverse bluish black patches on the head and body. A large triangular spot on the head. On the tail, the patches are so arranged as to cause the tail to appear annulate with grey and black. Summit of the head ash, punctate with dusky. Irides varied with greyish. Abdomen uniform blue-black. Toes annulate with blue and grey.

Length,	5·2.
Of tail,	2·3.

I am indebted to Major Le Conte for the drawing of this remarkable species, which he had observed in the western part of this State. It has been observed from Massachusetts to Carolina. It has also been noticed in Ohio.

THE LONG-TAILED SALAMANDER.

SALAMANDRA LONGICAUDA.

PLATE XVII. FIG. 41. — (CABINET OF THE LYCEUM.)

Salamandra longicauda. GREEN, Journ. Acad. Nat. Sciences, Vol. 1, p. 351.
S. longicaudata. HARLAN, Med. and Phys. Researches, p. 96.
S. longicauda. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 111, pl. 26.

Characteristics. Yellow; with numerous small black spots, becoming transverse bars on the tail. Tail more than twice the length of the body. Length 6 inches.

Description. Body slender, cylindrical. Head short; snout obtuse. Nostrils lateral, and near the end of the snout. Eyes small, but prominent. Palatine teeth in a diverging series. Tongue pediculated. Chin and neck smooth, with a slight gular fold. Tail compressed at the sides, slender, ending in a delicate point. Fore legs long and slender, with four slender subequal toes.

Color. The general color throughout is yellow. Head, body, chin and throat lemon-color; breast and abdomen yellowish white; under side of the fore and hind legs straw-colored. Head and body above, and on the sides, sprinkled with numerous small irregular black spots, points and dashes; these become confluent on the posterior part of the body and sides of the tail, forming vertical bars: all beneath immaculate. Pupil black; iris golden.

Length,	5·0 – 6·0.
Of the tail,	3·2 – 3·5.

The only specimen I have seen of this animal, is that in the Cabinet of the Lyceum, obtained near this city. Professor Green, its original describer, observed it near Albany. It is essentially aquatic, and is among the most beautiful of the genus. It usually affects deep caverns containing running water, and in this respect is associated in its habits with the Proteus of Carniola. It has been found at Pittsburgh, Pennsylvania, and in Ohio; but its southern limits have not been ascertained.

THE GRANULATED SALAMANDER.

SALAMANDRA GRANULATA.

PLATE XXIII. FIG. 66. — (STATE COLLECTION.)

Salamandra granulata. HOLBROOK, N. Am. Herpetology, Vol. 5.

Characteristics. Greenish slate above, varied with grey and brown beneath. Tail slightly longer than the head and body. Length 6 – 7 inches.

Description. Upper surface of the body and head as far as the eyes smooth, but under the lens, exhibiting an appearance like shagreen. Head above flattened, sub-truncate in front.

Tongue pediculate. Eyes prominent, with the upper margins of the orbits very projecting. Gular fold very distinct. Fore feet 0·5 in length, four-toed, very feeble in comparison with the hind feet, which are 0·8 in length, and furnished with five toes. Tail long and slender, very slightly compressed, and ending in a slender acute point.

Color. Above, a lustrous dark-greenish slate of a uniform hue. Chin and abdomen mottled with brown and grey. Lower surface of the tail uniform ashen grey. Gular fold soiled white. Soles of the fore and hind feet white.

Length of the head to the fold, ..	0·7.	Length of the tail from the vent,.	3·6.
From the cervical fold to the vent,	2·5.	Total length, ...	6·9.

The colors of this species must be received with some reserve, as it was derived from a specimen in spirits, sent to me by Dr. Emmons from the northern district of this State. That gentleman, however, saw it alive, and the colors were little changed. In the same vessel were specimens with a total length of 3·3, which I suppose to be younger individuals of the same species. It had the same markings, and the same granulated appearance, although not quite so obvious. The greatest observed difference was in the length and shape of the tail, which was 1·5 in length, compressed, carinate above, and pointed.

It need scarcely be added, that a more extended series of observations, and a more thorough knowledge of the changes effected by age, season and sex, are necessary before we shall be enabled to pronounce with certainty upon the specific identity of many of the animals of this genus.

This species is allied to the *subfusca* of Green; from which, however, it may be distinguished by the length of its tail, and the absence of spots on the upper part of the body. We believe, however, that *subfusca* was dropped as a species by its author. Dr. Holbrook informs me that he has observed the *granulata* in Pennsylvania.

THE STRIPED-BACK SALAMANDER.

(SALAMANDRA BILINEATA.)

PLATE XXIII. FIG. 67.

Salamandra bislineata. GREEN, Journ. Acad. Nat. Sciences, Vol. 1, p. 352, 1818.
S. flavissima. HARLAN, Am. Jour. 1825; Med. and Phys. Res. p. 98, 177.
S. bilineata. HOLBROOK, N. Am. Herpetology, Vol. 5.

Characteristics. Cinereous or brownish yellow; back with two or three black lines; beneath yellow. Tail longer than the head and body. Length three inches.

Description. Body slender, elongate. Head broader than the body, rather depressed; snout oval. Eyes prominent. A cervical fold. Tail tapering, compressed, pointed, longer than the head and body.

Color. Back cinereous (Green), brownish yellow (Harlan). Clear bright yellow or whitish beneath. A broad black line on each side, extending from behind the eyes to the end of the tail; a narrow vertebral black line from the occiput to the base of the tail: this third line is occasionally absent or nearly effaced. Iris yellow.

Length, 3·0.

Although this species is said to be very common, both by Green and Harlan, I have never had the good fortune to meet with it, and have consequently been compelled to use their description. It is said to be very active; found in shallow water, beneath stones in moist places, or on the borders of brooks in shady situations. Dr. Eights obtained several specimens from the *Dripping Well* near Albany, while engaged in digging up a soft bed of earth, marl and decomposed vegetable matter, which had accumulated beneath. He states that some of them were beyond the usual size, and in these the longitudinal lines could scarcely be detected.

The geographic limits of this species, thus far ascertained, extend from New-York and Pennsylvania to Ohio.

THE RED SALAMANDER.

SALAMANDRA RUBRA.

PLATE XVII. FIG. 43. — (STATE COLLECTION.)

Salamandra rubra. DAUDIN, Hist. Rept. Vol. 8, p. 227, pl. 97, fig. 2.
S. maculata et *rubriventris.* GREEN, Journ. Acad. Nat. Sc. Vol. 1, p. 350 and 353.
S. maculata et *rubriventris*, var? HARLAN, Med. and Phys. Researches, p. 96 and 97.
S. maculata. Brown Spotted Salamander. STORER, Mass. Rep. p. 253.
S. rubra. HOLBROOK, N. Am. Herpetology, Vol. 4.

Characteristics. Red, (in cabinets dull salmon,) with numerous black dots. Tail nearly as long as the body, 4 – 6 inches.

Description. Body robust, cylindrical, smooth, slimy. Head moderate, flattened above; snout rounded. Nostrils small, anterior. Tongue pediculate. Teeth diverging on the palatines. Fore legs moderately robust, with four small subequal toes; hind legs very stout, with five toes, the interior shortest. Tail continuous with the body, rapidly diminishing towards the acute tip, and compressed on the sides; a prominent ridge on the upper edge, which may be traced more or less distinctly to a point vertical to the vent.

Color. In cabinet specimens, light brownish or dusky yellowish, sprinkled on the head, body and extremities, with reddish brown spots. In the living specimens, the general color above and beneath is red, more or less vivid, and the roundish spots are black; these spots are usually larger and more crowded on the summit of the head and along the dorsal line, smaller and more scattered on the sides of the body and tail. Beneath almost immaculate, except under the throat and breast.

Length,	3·0 – 5·0.
Tail,	1·3 – 2·2.

This is one of our commonest species, and is usually found under stones in shallow streams. If this be indeed the *S. rubra* of Daudin, as Holbrook maintains, I must suppose the "bande longitudinale assez large, noirâtre et comme brûlée," on the under side of the body, to have been accidental, as I have never seen it in the many individuals which I have examined.

THE SCARLET SALAMANDER.

S. COCCINEA.

PLATE XXI. FIG. 54. B. — (STATE COLLECTION.)

Characteristics. Scarlet, with two or more ocellate spots on the sides. Length 2 – 6 inches.

Description. Body cylindrical, smooth. Tail rounded, tapering, and, measured from the vent, equalling the head and body in length.

Color. Bright scarlet, passing insensibly into bright orange red beneath. Three inequidistant rounded vermilion spots, margined with black, on each side of the dorsal ridge. Eyes black, with a metallic golden margin under the superciliary ridge. A dark longitudinal abbreviated stripe passes through the eye.

Length of the head and body,	1·9.
Ditto of the tail,	1·9.

This is a species which appears to dwell almost constantly on land. It was first seen by me near Lake Pleasant, Hamilton county, in a forest, just after a shower. Mr. I. Cozzens states that he has observed this species on Anthony's Nose; and Major Le Conte informs me that he has seen it from four to six inches long, under stones in Chenango county. Its brilliant coloring, however carefully kept, disappears, and fades into a uniform dark olive-brown; the spots remaining unchanged, unless kept for a long time in alcohol.

THE BLUE-SPOTTED SALAMANDER.

SALAMANDRA GLUTINOSA.

PLATE XVII. FIG. 42. — (STATE COLLECTION.)

Salamandra glutinosa. GREEN, Journ. Acad. Sciences, Vol. 1, p. 357.
S. variolata. GILLIAMS, Ac. Sc. Vol. 1, p. 480, pl. 18, fig. 1.
S. cylindracea. HARLAN, Med. and Phys. Researches, p. 94.
S. glutinosa. STORER, Mass. Report, p. 253. KIRTLAND, Zoology of Ohio, p. 168.

Characteristics. Small, smooth, polished. Bluish black, with small irregular bluish white spots. Length 4 – 6 inches.

Description. Snout blunt and rounded. Gular fold distinct. Nostrils small, nearer the snout than to the eyes. Eyes large, prominent and distant. Fore legs 0·38 long, slender, four-toed; the two middle ones longest, subequal. Hind feet more robust, 0·4 long, five-toed. Tail plump and rounded when alive, and continuous with the body, tapering to a blunt point. In spirits, the tail appears compressed, ancipital.

Color. Above, polished, plumbaginous; towards the end of the snout, marbled with ash. Neck and body sprinkled with numerous irregular minute transparent bluish spots, and a series of rather larger ones along the body; in spirits, these become ash-colored. Upper edge of the tail with a similar series of large transparent bluish spots, extending sometimes to its extremity. Head and body beneath paler. Axilla of the anterior extremities whitish. Toes annulate with dusky and pale flesh-color.

Length,	1·80.
Of tail,	0·75.
Of body from the vent,	0·80.

The specimens from which the above description was drawn, were procured by Mr. I. Cozzens from dry elevated grounds near this city. It is to be observed that this species, which when alive had a rounded cylindrical and tapering tail, in spirits the same part became compressed and edged above and beneath. This should lead to great caution in receiving descriptions of species of this family, drawn up from cabinet specimens.

The Blue-spotted Salamander appears to be allied in a measure to the *nigra*, as far as we judge by the brief description of Green. I am inclined to suspect *S. jeffersoni* of the same author to be a variety of this species. It sometimes is found six inches long. It has been observed from Massachusetts to Pennsylvania, and also in Ohio.

(*EXTRA-LIMITAL.*)

S. cirrigera. (Holbrook, N. Am. Herp. Vol. 5, plate.) Yellow speckled with white; two short fleshy cirri above the upper lip; a black line on each side, edged with white. Length three inches. *Louisiana.* An Var. *S. bilineatæ?*

S. sinciput-albida. (Green, Ac. Sc. Vol. 1, p. 352.) Above dusky ferruginous; beneath yellowish; nose white. Tail short, thick, tapering, shorter than the body. Length three inches. *New-Jersey.*

S. fusca. (Id. Ib.) Yellowish brown; beneath white, with a line on each side of black spots. Tail slightly compressed, as long as the body. Length three inches. *New-Jersey.*

S. guttolineata. (Holbrook, Herp. Vol. 2, pl. 12; and Vol. 5, 2d Ed.) Straw-colored, with a vertebral line of black bifurcating behind the occiput; a lateral black band, in which is a row of white spots, and beneath this a white line. Length six or seven inches. *Carolina.*

S. auriculata. (Id. Ib. Vol. 3, pl. 28; and Vol. 5, 2d Ed.) Dusky brown; greyish with minute spots beneath, and a series of small reddish brown spots on each side; a reddish brown spot behind the place of the ear. Length five inches. *Georgia.*

S. talpoidea. (Id. Ib. Vol. 5.) Uniform dusky throughout; body short and thick; head large, with a contracted neck. Tail continuous, compressed towards the tip. Length three inches. *Sea islands, S. C.*

S. quadrimaculata. (Id. Ib. Vol. 5, plate.) Head rather large; snout rounded. Body elongated, stout, dusky above, tinged with purple, and with two series of elongated subquadrate red spots. Tail of a similar color, with a red central line. Length three and a half inches. *Pennsylvania to Georgia.*

S. haldemani. (Id. Ib. Vol. 5.) Head flattened above; snout rounded. Body and tail pale yellow above, slightly olive at the flanks, marked with dusky spots and blotches disposed in three irregular longitudinal series. Length four inches. *Pennsylvania to Virginia.*

GENUS TRITON. *Laurenti, Holbrook* partim.

Tongue fish-like, attached more or less at its borders, only free at its anterior extremity. Tail compressed. Length various.

Obs. This genus is composed strictly of aquatic species; occasionally, however, they are found on land.

THE TIGER TRITON.

(Triton tigrinus.)

PLATE XV. FIG. 32—(STATE COLLECTION.)

Salamandra tigrina. Green, Jour. Acad. Nat. Sc. Vol. 5, p. 116.
S. id. Harlan, Med. and Phys. Researches, p. 93.
S. id. Holbrook, N. Am. Herpetology, Vol. 3, p. 109, pl. 25.

Characteristics. Bluish black, with numerous irregular yellowish blotches over the head, body, tail and extremities. Tail compressed from its origin. Length six inches.

Description. Body robust, cylindrical, smooth. Head broad and rounded. Nostrils small, lateral. Eyes large and prominent. Mouth wide. Neck contracted with a fold. Fore feet short, with four toes. Tail longer than the body, and compressed to a very thin edge above and beneath. Beneath granulate.

Color. Above bluish black; in a modified light, lustrous. The spots on the upper surface pale ochre or lemon yellow, rounded or oblong; their general direction is vertical to the axis of the body. Chin dusky yellow. Abdomen greyish, with dull yellow blotches. Pupil black; irides brown and yellow. Tail unspotted beneath.

Length, 6·0 – 7·0.

I am unacquainted with the habits of this species, except that it is occasionally found in decayed hollow trees. Those which I obtained, were from the vicinity of Oneida lake. It resembles, in some respects, the *S. subviolacea;* but a slight attention to its characters will show it to be specifically distinct.

THE CRIMSON-SPOTTED TRITON.

TRITON MILLEPUNCTATUS.

PLATE XV. FIG. 34. — (STATE COLLECTION.)

Salamandra dorsalis. HARLAN, Jour. Acad. Nat. Sc. Vol. 6, p. 101; Med. and Phys. Res. p. 99.
S. id. HOLBROOK, N. Am. Herpetology, Vol. 2, p. 57, pl. 10.
S. millepunctata. Many-spotted Salamander. STORER, Mass. Report, p. 249.

Characteristics. Olive, with crimson spots; the two colors above and beneath distinctly separated. Tail compressed, tapering. Length 3 – 4 inches.

Description. Body cylindrical, granulated as in the preceding. Tail much compressed, its edges almost membranaceous, longer than the body. Fore feet long and slender, with four toes, one rudimentary. Hind feet more robust; outer toes small.

Color. Above, olive brown, varying in hue from light brown to deep olive green. On the flanks, sometimes on the sides of the throat, and occasionally for some distance along the sides of the tail, with a row of crimson circular spots bordered with black; these spots vary in number from two to ten, at least this is the greatest number that has fallen under my notice. Beneath yellowish, punctured with black, and separated distinctly from the brown of the parts above; the punctures extend over the belly, inside of the legs, and upper parts of the body and tail. In long preserved cabinet specimens, the line of separation between the colors above and beneath become effaced, and the crimson spots change to white.

Length, 3·0 – 4·0.

This species had originally the misfortune to be so badly named, and the description, which was taken from a changed cabinet specimen, gave such an imperfect and false idea of the animal, that we have adopted the name originally applied by Dr. Storer, both as more descriptive in itself, and as being the first true description of the species. We presume this to be a case where the law of priority can have no force, and where the original describer we imagine would cheerfully agree to the change. In some parts of the State it is called *Evet*, which name is also applied to several other species, and is evidently a corruption of *eft*.

I have met with this animal in brooks, and in every part of the State. It is capable of withstanding a low temperature, for Holbrook saw them swimming about with great vivacity under ice an inch thick. It feeds on insects, and, according to Dr. Storer, casts its skin in June.

THE DUSKY TRITON.

TRITON NIGER.

PLATE XV. FIG. 35. — (STATE COLLECTION.)

Salamandra niger. GREEN, Jour. Acad. Nat. Sc. Vol. 1, p. 352.
S. id. HARLAN, Med. and Phys. Res. p. 97. EIGHTS, Zodiac, Albany, 1835.
Triton niger. HOLBROOK, N. Am. Herpetology, Vol. 5, plate.

Characteristics. Back black; sides with small white spots. Tail compressed, as long as the body. Length 4 – 6 inches.

Description. Body smooth, tapering. Head large, broadly rounded in front. Eyes approximated, prominent. Two or three series of mucous pores between the eyes and nostrils. A moderate fold under the neck. Toes unusually long. Tail sub-cylindrical at its origin, becoming gradually compressed, and tapering to a point, with moderately acute edges. Tongue with numerous papillæ.

Color. Uniform dark brown or black; somewhat whiter beneath, especially on the lower edge of the tail. Three or four obsolete whitish dots on the chin.

Length,	5·0 – 6·0.	Fore legs,	8·80.
Head and body,	3·0.	Hind legs,	1·10.
Tail,	2·8.	Longest toe of the hind foot,	0·45.

Dr. Eights observed many of this species, "in wet springy places near running streams," in the neighborhood of Albany. Prof. Green assigns shallow waters as their usual habitat. The young are yellowish brown, especially along the back. This was noticed by Dr. Eights, who observed them "to vary from the original description, being as universally yellowish "brown as black." I am indebted to Prof. Emmons for specimens from Peru, Clinton county.

THE GREY-SPOTTED TRITON.

TRITON PORPHYRITICUS.

PLATE XVI. FIG. 37. — (STATE COLLECTION.)

Salamandra porphyritica. GREEN, Maclurian Lyceum, Vol. 1, p. 3, pl. 1.
S. id. HARLAN, Med. and Phys. Researches, p. 98.

Characteristics. Glossy black, slimy, with minute irregular greyish spots. Length seven inches.

Description. Body smooth, robust, and tapering insensibly to the extremity of the tail; covered with a viscid secretion. Head ovate, depressed. Rictus wide. Eyes very prominent, and black. Anterior feet four-toed, half the size of the hind feet, which are furnished with five. Tail cylindrical, scarcely compressed.

Color. Shining black above, with numerous minute irregular grey or pale-ash spots distributed over the head, back and tail; the spots on the flanks are larger, and inclined to brownish. Belly uniform plumbeous; inferior and posterior portions of the tail rather lighter.

Total length,	7·0.
Of tail,	4·0.

This large Triton, which in its form resembles the last described species, was captured by Mr. I. Cozzens in the neighborhood of New-York. I had referred it originally to the *glutinosa* of Green; from which, however, it is obviously distinct by its shorter tail. The brief notice of *porphyritica* is very unsatisfactory; but I prefer placing it provisionally under that name, rather than to introduce a new nominal species. The *suprafusca* of Green may have been derived from a cabinet specimen.

The Grey-spotted Triton conceals itself under rocks and stones in moist places, and is exceedingly active in its movements.

(*EXTRA-LIMITAL.*)

T. ingens. (Green. Ac. Sc. Vol. 6, p. 256. Holbrook, Herp. Vol. 5.) Ferruginous throughout, with dark bluish blotches. Tail compressed, and more than half the total length. Edge of the external toes of the hind legs fimbriated. Total length eleven inches. *New-Orleans.*

T. jeffersoni. (Green, Mac. Lyc.) Light brown, sprinkled with azure blue points. Tail subcompressed, as long as the body. Length seven inches. *Pennsylvania.*

FAMILY SIRENIDÆ.

Body elongate, formed for swimming. Feet either four, or two anterior only. Tail compressed, persistent. Respiration aquatic by gills throughout life, coëxistent with rudimentary lungs. Gills external, persistent. Eyes with palpebræ.

This group corresponds with the order *Amphipneusta* of Bell, and the sub-class *Diplopneumena* of Hogg. It comprises the genera *Siredon*, *Siren* and *Menobranchus*; of the latter genus, we have a representative in this State.

GENUS MENOBRANCHUS. *Harlan.*

Head large, flattened, truncate. Two rows of small conical teeth in the upper jaw; one row beneath. Four feet, with four free toes on each.

Although the type of this genus has received a variety of names, yet we are indebted to Dr. Harlan for the first clear and distinct account founded on its anatomical characters. It has been vaguely called *Salamandra*, *Triton*, *Proteus* and *Necturus*, without sufficiently eliminating or restricting its characters. The name proposed by Harlan must therefore be considered as firmly established.

THE BANDED PROTEUS.

MENOBRANCHUS LATERALIS.

PLATE XVIII. FIG. 45. — (STATE COLLECTION.)

Triton lateralis. SAY, Long's Expedition, Vol. 1, p. 5.
Proteus of the Lakes. MITCHILL, Sill. Jour. Sc. Vol. 4, p. 181; and Vol. 7, p. 62, pl. 2.
Menobranchus lateralis. HARLAN, Ann. Lyc. Nat. Hist. N. Y. Vol. 1, p. 233, pl. 16; Med. and Phys. Res. p. 89 and 165. CUVIER, Règne Animal, Griffith's translat. Vol. 9, p. 412 and 475, pl. copied.
Proteus lateralis. BARNES, Am. Journ. Sc. Vol. 11, p. 285.
P. maculatus. Ib. Ib. Vol. 13, p. 68.
M. lateralis. HOLBROOK, N. Am. Herpetology, Vol. 3, p. 119, pl. 30.

Characteristics. Brownish, with blackish spots; often a dark lateral line. Length one to two feet.

Description. Body robust, cylindrical, smooth. Head broad, depressed and attenuated in front, where it is truncate and slightly emarginate. Eyes small. Nostrils very minute, and placed in the margin of the upper lip. Jaws covered with loose fleshy lips. Teeth minute, conic, obtuse and separated; two series in the upper jaw, and one in the lower jaw. Tongue broad, and free near the tip. Gills, three on each side, ramified and fringed, with two branchial apertures. Throat with a fold of skin beneath. Anterior extremities slender, placed near the gills, and with four clawless toes. Hind legs similar, and with four similar toes. Vent a longitudinal fissure. Tail robust, compressed, lanceolate, ancipital.

Color, of the body and tail dull brownish, spotted with black or blackish brown; on the back these are rounded, but on the sides of the body and tail become indistinct brownish blotches. Beneath lighter. Frequently a dark stripe from the nostrils through the eyes, and becoming effaced behind. Gills blood-red.

Length, 12·0 – 24·0.

This curious and interesting aquatic animal is common in the northern and western parts of the State. It is found in Lake Champlain, and is particularly abundant at the falls of Onion river and at the outlet of Lake George. It inhabits Lake Erie, Seneca and the other lakes in the western districts of New-York. It has been found in the Erie canal, and will doubtless ere long be found to have reached the Hudson river. It occurs in all the streams in Ohio emptying into Lake Erie, and sometimes in the tributaries of the Ohio. Their movements in the water are usually slow; but from their broad and powerful tail, they must occasionally move with great celerity. They are said to come occasionally on land. It is often taken with the hook, and frequently speared.

The Menobranchus, or *Big Water-lizard* as it is occasionally called in this State, feeds on fluviatile shells, crustacea, and the smaller fishes. Its flesh is white, and doubtless very savory, but is never eaten by the ignorant fishermen, who regard them with great disgust and detestation. A closely allied animal, the *Axolotl* of Mexico (Siredon pisciformis), is considered a great delicacy; and indeed almost the whole class of reptiles and amphibia furnishes a delicate and savory food.

(*EXTRA-LIMITAL.*)

Genus SIREN, *Linneus, Auct.* Body eel-shaped. Two anterior legs. Teeth in the palate and jaws.

OBS. The two last species of this genus have been arranged by some authors under the genus Pseudobranchus.

S. lacertina. Black above; dusky beneath. Toes four. Length two to three feet. *South Carolina, Florida.*

S. intermedia. (LE CONTE, Ann. Lyc. Vol. 2, pl. 1.) Similar to the preceding, but smaller. Gills included in a fleshy trilobate covering. Length, one foot.

S. striata. (ID. Ib. Vol. 1, pl. 4.) Dusky, with two longitudinal stripes on each side. Gills as in the preceding. Length, seven to nine inches.

FAMILY AMPHIUMIDÆ.

Body long, formed for swimming. Feet four. Cranium solid. Tail compressed. Respiration by means of lungs only. No gills, but only cervical orifices. No metamorphosis known.

This family is equivalent to the order *Abranchia* of Bell, and to the families *Menopomatidæ* and *Amphiumidæ* of Hogg and Bonaparte.

(*EXTRA-LIMITAL.*)

Genus AMPHIUMA, *Garden, Harlan.* Body eel-shaped. Head and neck continuous. Legs feeble, rudimentary, with two or three jointless toes. No ribs. Two rows of teeth in the upper, and one in the lower jaw.

A. means. (HARLAN, Ann. Lyc. Vol. 1, pl. 22.) Dark brown. Feet bifid at the extremities. Length one to three feet. *South Carolina to Mexico.*

A. tridactylum. (CUVIER, Tr. Acad. Sc. 1826, pl.) Similar to the preceding. Feet trifid. *Alabama, Arkansas.*

GENUS MENOPOMA. *Harlan.*

Body robust. Head distinct from the neck. Tail broad, compressed. Lower jaw with a single row of teeth; upper jaw with an additional row. Ribs rudimentary. Legs stout, with four toes before and five behind.

OBS. This genus was first distinctly established by Dr. Harlan, under the name of *Abranchus*, which having been discovered to be preöccupied, he changed it to *Menopoma*. Others have proposed new names either erroneous in themselves, or unaccompanied with descriptions. Such are those proposed, but not defined by Prof. Barton, under the names of *Salamandra horrida, gigantea, maxima*, and *Protonopsis horrida*.

THE ALLEGANY HELL-BENDER.

MENOPOMA ALLEGHANIENSIS.

PLATE XVIII. FIG. 44.—(CABINET OF THE LYCEUM.)

Salamandra alleghaniensis, Sonnini. LATREILLE, Hist. Nat. Rept. Vol. 2, p. 253, fig. 1.
Le Salamandre des Monts Alléganies. DAUD. Hist. Nat. Rept. Vol. 8, p. 231.
Abranchus alleghaniensis. HARLAN, Ann. Lyc. Vol. 1, p. 233, pl. 17 and 18.
Menopoma. ID. Ib. p. 270.
Menopoma alleghaniensis. BARNES, Am. Journ. Science and Arts, Vol. 11, p. 278.
M. id. HARLAN, Med. and Phys. Res. p. 87 and 174. Griffith's Cuvier, Vol. 9, p. 410, 475, plate.
Molge. MERREM.
Cryptobranchus. LEUKARD & FITZINGER.
Young Alligator. KIRTLAND, Zool. Ohio, p. 190.

Characteristics. Slate-colored, mottled with dusky. Head broad. Tail nearly as long as the body. A dark line through the eye. Two outer toes of the hind feet palmate. Length one to two feet.

Description. Body robust, cylindrical, smooth. Tail vertically compressed, and nearly as long as the body. Vent a small longitudinal slit. Head wide, depressed, especially towards the snout, which is obtusely rounded. Nostrils prominent. Eyes small. Legs robust, short; the fore legs with four free subequal toes. Hind feet with five toes, the two outer palmate; the outer edge of the outer toe with a broad membrane to assist in swimming. Tail much compressed, obtusely pointed, membranous on its upper edge, which extends some distance along the back. The cervical aperture covered with a simple fold. Lungs vesicular, elastic, vascular as in the tortoise. Vertebræ nineteen. Tongue free in front.

Color. Dark slate or greyish with darker spots. A dusky abbreviated line passes through the eyes.

Length 12·0 – 24·0.

I have never met with this animal myself in this State; but Prof. Hall assures me that he has seen it in the Allegany river, one of the tributaries of the Ohio, within the limits of this State. It feeds on worms, crayfish, fishes and aquatic reptiles. It is said to be extremely voracious. Dr. Kirtland states, that in the State of Ohio, it occurs in all the tributaries of the Ohio, but not in those of Lake Erie.

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ZOOLOGY

OF

NEW-YORK,

OR THE

NEW-YORK FAUNA;

COMPRISING DETAILED DESCRIPTIONS OF ALL THE ANIMALS HITHERTO OBSERVED WITHIN THE STATE OF NEW-YORK, WITH BRIEF NOTICES OF THOSE OCCASIONALLY FOUND NEAR ITS BORDERS, AND ACCOMPANIED BY APPROPRIATE ILLUSTRATIONS.

BY JAMES E. DE KAY.

PART IV. FISHES.

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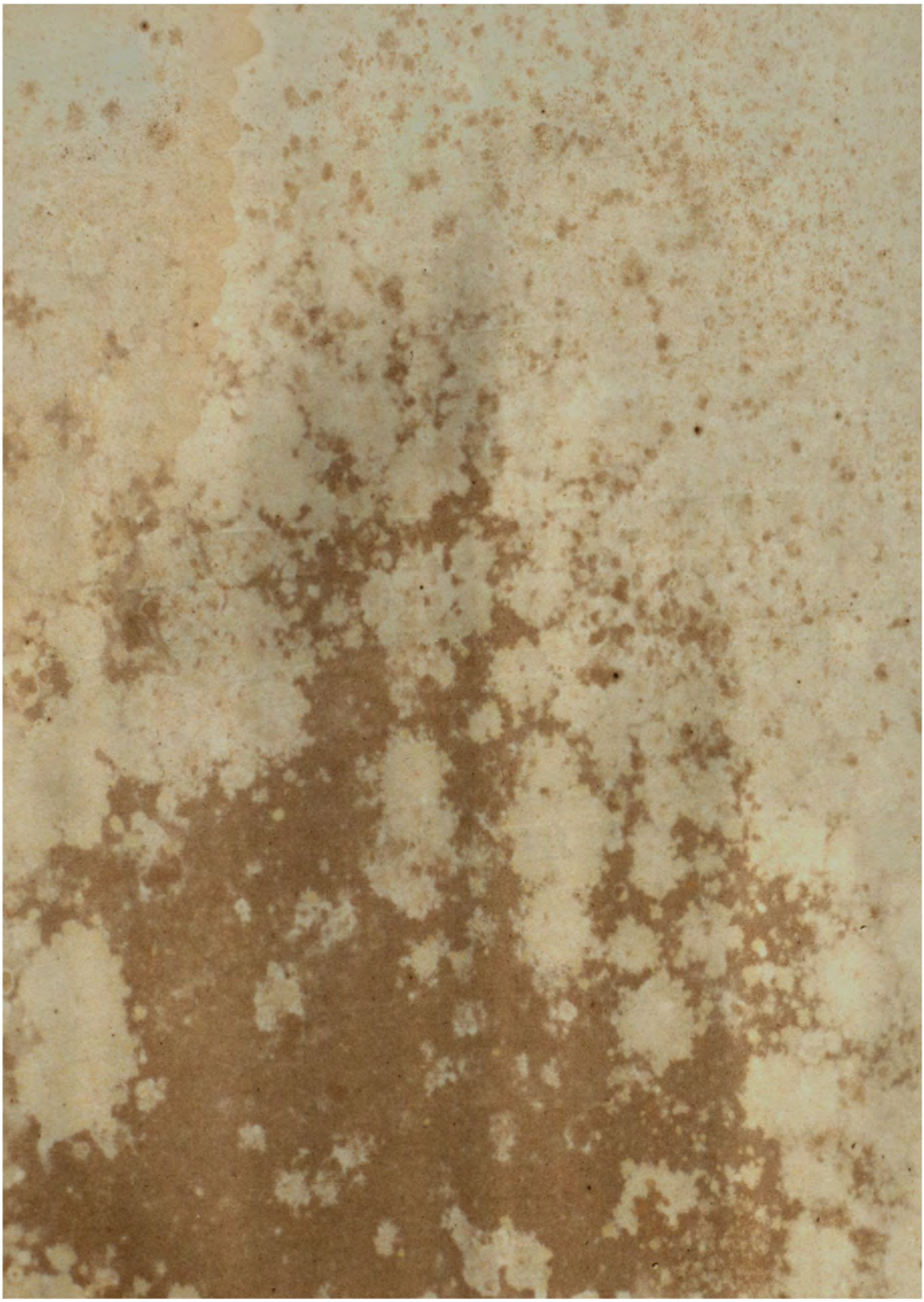

PREFACE.

In the General Introduction to this work, a few facts were noted, to illustrate the peculiar position of this State in reference to the number and variety of its animal species. In continuation of this subject we may remark, that by means of the great lakes Ontario and Erie on our northern and western borders, we have numerous northern lacustrine fishes. Through Lake Champlain we have many northern fluviatile species; by the Alleghany river ascend numerous western species; and while our numerous rivers teem with those of fresh water, our extensive sea-board furnishes us with marine species ranging from the coast of Labrador to the shores of Brazil. It cannot therefore fail to be perceived that the Ichthyology of New-York will embrace a very large proportion of the Fishes of the United States; and that the following pages can only be considered in the light of an outline, to be filled up, and enlarged and modified by the labors of future naturalists.

The study of Fishes, or that branch of natural science which is termed Ichthyology, has, until recently, attracted in this country less attention than any other. Almost the first positive knowledge of our fishes is derived from Linneus, who received many through Dr. Garden of Charleston, South Carolina. From the letters of Garden, we gather that he was an indefatigable collector in all departments of Natural History, and a man of eminent attainments. Cotemporaneously with Garden, appeared the work of Catesby on the Natural History of Carolina, Florida and the Bahama Islands. This work is imposing in its form,

but is of little real practical value. The plates are grossly colored, and some of them are apparently drawn from memory. The text is meagre and insignificant.*

In an unexpected quarter, appeared in 1787 an original work on the Fishes of America. We allude to the Natural History of Cuba, by Antonio Parra, the title of which will be found in our list of cited works. It is not exclusively confined to fishes, but embraces crustacea, marine plants, etc. There are forty plates, illustrating seventy-one species of fishes, coarsely but vigorously executed by his son; and as far as we have had occasion to compare them with the originals, they are very correct. This work is exceedingly rare, and the copy in my possession is believed to be the only one in the United States. The text is brief, and of a popular character, without any attempt at classification or scientific arrangement. Notwithstanding these defects, it will always remain, from its original figures and its descriptions drawn from the recent specimens, a work of great value to naturalists, and more especially to those of the Southern Atlantic States.

Pennant, an English writer on natural history, published in 1787 a supplement to his Arctic Zoology, which contains an enumeration of one hundred and thirty species of fishes, compiled chiefly from Linneus and Catesby. They are principally from the waters of South-Carolina and the Gulf of Mexico. A very few, scarcely exceeding six new species, are noticed more in detail, and these are chiefly from the collection of Mrs. Anne Blackburne, whose brother appears to have been a zealous collector for several years at Hempstead, Long island.

In 1788, Schœpff, an army surgeon, who was in this country during the war of the revolution, published in the Transactions of the Friends of Natural History at Berlin, a memoir entitled "Descriptions of North American Fishes, chiefly from the waters of New-York." His paper is for the most part a meagre catalogue of species from New-York and the gulf of Mexico, mostly identical with those previously described by Linneus. In common with many of the observers of that period, he had such a slavish deference to the great reformer of natural science, that he scarcely dared to pronounce upon the validity of a species unless

* In taking a review of what has been done in American ichthyology up to the period at which he wrote, Pennant breaks out into the following apostrophe: "How small a part is this of the zoology of our lost dominions! May what I have "done be an inducement for some learned native to resume the subject! and I shall without envy see my trivial labors lost "in the immensity of new discoveries. Vain thought! for ages must pass, ere the necessary perfection can be given, "ere the animated nature which fills the space between the Atlantic and Pacific oceans can be investigated. Ages must "pass, before new colonization can push its progress westwardly; and even then, civilization, ease and luxury must take "place ere those studies in which use and amusement are so intimately blended can be carried into effect."

it had received the Linnean stamp of authority. One hundred and twenty species are enumerated, of which thirty only are accompanied with detailed descriptions. The celebrated ichthyologist Bloch added a few notes to this memoir.*

Bosc, and a few other naturalists, had communicated to Lacépède some isolated species after this period; and Dr. Peck had described, in the Transactions of the American Academy of Arts and Sciences at Boston, a few more; but, with these exceptions, our knowledge on this subject remained nearly stationary until 1814, when Dr. Mitchill published a small tract, which may be said to have given a new impulse to the study of American ichthyology. It contains original and detailed descriptions of forty-nine species, with a simple catalogue of twenty-one more. On the titlepage of this little tract, he states that "a very considerable number of these *beginnings of an attempt* are not even named in the present list, because they have not come to hand during the few weeks that have elapsed since its commencement." It does not, however, appear to have attracted much attention abroad, and is only cited in the latter volumes of the great work on Fishes of Cuvier and Valenciennes. About the same period he published in the American Medical and Philosophical Register, conducted by Drs. Hosack and Francis, a paper on the Cod-fishes of New-York, in which he enumerates eleven species and six varieties of that family. In December of the same year, he read before the Literary and Philosophical Society of New-York, a paper entitled "The Fishes of New-York, described and arranged;" which was shortly after published in the Transactions of that Society. In this paper, which at that period was the most important and valuable essay on the fishes of the United States, he describes (deducting the foreign and doubtful fishes) one hundred and thirty-four species, illustrated by six copperplates, containing seventy small but quite recognizable figures.† In February, 1818, he published a supplement to

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* Schœpff appears to have been a man of varied attainments, and has left several works relating to the natural history of this country, the most important of which is his Historia Testudinum. He is the author of two volumes of travels in the United States, and of a work on its geology, under the following titles:

1. Reise durch einige der mittlern und sudlichen vereinigten Nord Americanischer Staaten. 2 vols. 8vo. Erlangen, 1788.
2. Beytrage sur mineralogischen kentniss der ostlichen theil von Nord America und seiner geburge. pp. 194. Erlangen, 1787.

Neither of these, we believe, have been translated into our language.

† This memoir is spoken of by Cuvier in the following terms: "Thus there had scarcely been in the eighteenth century any thing on the fishes of North America, except the work of Catesby, and what had been inserted by Pennant in his Arctic Zoology. But in 1815, Dr. Mitchill, a learned physician of New-York, gave a history of the fishes in the vicinity of that city, in which he described one hundred ond forty-nine species, distributed after the system of Linnæus, with well

this paper in the American Monthly Magazine, in which he describes forty-two species, some of which had been figured in the previous essay, but without any description. If we subtract from these, four as doubtful or mere varieties, and eight from the Bahama islands, we have thirty additional species, making with those previously published a total of one hundred and sixty-four fishes from the coast of New-York. The work in which this supplement appeared was a literary magazine of considerable reputation, but its circulation was limited, and it appears to have been little known or consulted either by our own or by foreign naturalists.

Subsequent to this period, the communications of Dr. Mitchill on ichthyology were distributed through periodicals of every description, not even excepting weekly magazines and daily newspapers. As a matter of interest to the American naturalist, we have, in Appendix A, given a list of Mitchill's species, collated from all these sources, and accompanied them with the names which they bear in the present work. It is no reflection upon the reputation of this naturalist, that these changes have been rendered necessary; for at that day, ichthyology was little studied, and it was far from having attained its present accuracy. He appears to have trusted too much to the vague descriptions of foreign writers, and referred too hastily, descriptions of European to American species. In his case, however, it did not amount to a servile deference to authority; for even in his preliminary essay, he indicates new generic forms, some of which have been adopted in the great standard work of the present day.

Nearly simultaneous with the first essays of Dr. Mitchill, appeared a new and important laborer in the field of American ichthyology. We allude to Mr. Charles A. Lesueur, an eminent French naturalist, who had accompanied Daudin as a draftsman in his exploring expedition. He lived several years in Philadelphia, subsequently removed to the settlement of Mr. Owen at New-Harmony, and finally returned to France. His contributions are chiefly to be found in the Journal of the Academy of Natural Science, and the Transactions of the American Philosophical Society. He also contributed a few articles to the Annales

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executed though small figures of the most interesting. As he adopted but two of the genera subsequent to Linneus, his species are sometimes placed a little at random; in the genus Esox, for example, he includes many heterogeneous species. Nor has he always unravelled the true nomenclature in the often confused works of European naturalists; but he has himself furnished in his descriptions the means of rectifying the errors which had escaped him, and his memoir is certainly the best which has appeared in this century on the fishes of the new world." *Histoire d'Ichthyologie*, p. 202.

du Museum d'Histoire Naturelle of Paris. M. Lesueur at one time contemplated publishing a history of North American fishes, but I believe never advanced farther than to prepare a few plates and a few pages of letter press. Through the kindness of Mrs. Say, the estimable widow of our great American naturalist, I am indebted for a copy of this work as far as published. The part in my possession contains descriptions of *Petromyzon americanus* and *nigricans*, *Ammocetes bicolor*, and *Acipenser rubicundus;* the plates illustrate these species, and also *Petromyzon lamottenii*, *Acipenser maculosus*, *measius*, and two other sturgeons not named on the plate. Most of these are reproduced in the following pages; and as the work of Lesueur is probably in few hands, I should have copied them all, had they been accompanied with the requisite descriptions.

Pursuing a chronological order, we have next to mention a work which may be said to have created a new epoch in this department of science. We allude to the Natural History of Fishes, by Cuvier and Valenciennes, of which the first volume appeared in 1828, and which has now reached the sixteenth volume. To judge by the field already explored, it will probably require ten more volumes to complete the work. In this History, which may well serve as a model to future observers for its philosophical spirit and unrivalled accuracy of detail, are to be found many excellent descriptions of North American species. The many obligations I owe to this standard work, will be apparent in the following pages.

In 1836, Dr. Richardson published a work, which, although limited to the fishes of the northern regions of America, is of great value to the ichthyologist of the United States. It contains original and elaborate descriptions of about sixty species, illustrated by twenty-four beautiful plates, and is one of the most important contributions to this department. This work is published at the expense of the English government, and we may be allowed to hope that a similar enlightened liberality will be displayed by the government of the United States, in the publication of the results of the late Antarctic exploring expedition.

The attention of the various Commonwealths of the Union having been directed to the examination and description of their various natural products, almost one of its first fruits appeared in 1835, in the form of a copious catalogue of the animals and plants of Massachusetts. In 1838, appeared under the auspices of the State of Ohio, a report by Dr. J. P. Kirtland on the Zoology of that State. It contains a catalogue of seventy-two species of fish; all, of course, fluviatile or lacustrine. It is accompanied by numerous and valuable notes, illus-

trating the habits and characters of fishes. To the same author, we are indebted for several important papers in the Boston Journal of Natural History. In 1839, Dr. D. H. Storer, who had previously furnished several valuable papers on ichthyology in the Journal just alluded to, published a masterly report on the Fishes of Massachusetts. In this report, the author has enumerated one hundred and nine species, of which one hundred and four are accompanied by original and carefully drawn up descriptions. This report is an invaluable document to the American ichthyologist, and is every way worthy of its eminent author. Among the casual contributors to this department of science, we have to enumerate the name of a former Governor of this State, De Witt Clinton; of Mr. Wood of Philadelphia; of Messrs. Redfield, father and son; and quite recently, of Mr. Haldeman, of Pennsylvania.

Having thus briefly alluded to the various sources from whence is derived our knowledge of the fishes of this country, the pleasing duty remains, of expressing my obligations to those who have assisted me in my solitary and arduous undertaking. Several years since, my friend Dr. Holbrook, so favorably known for his work on the Reptiles of the United States, contemplated publishing a work on the Fishes of Carolina. He collected many species, and caused them to be carefully drawn under his own eye, by the same artist who had so successfully figured the reptiles. These drawings, illustrative of fifty-two species, he placed in the kindest manner at my disposal, and they have enabled me to extend our acquaintance with the geographical distribution of many species. I feel much indebted to Dr. Storer for the instruction I have derived from his correspondence, and for the prompt and liberal aid he has afforded by furnishing me with several specimens for illustration and comparison. To Mr. I. Cozzens, Librarian of the Lyceum of Natural History, I am under many obligations for his assistance in collecting, and his accurate and practical discrimination of species. My thanks are also due, for several specimens from Lake Champlain, to Mr. Z. Thompson of Burlington (Vermont), who is occupied in publishing a work on the Natural History of Vermont, at the moment these sheets are passing through the press.

In no department of the natural sciences is the want of good illustrations more strikingly felt than in the class now before us. Those which relate to American fishes are distributed through so many rare and expensive volumes as to render them difficult of access, and indeed entirely beyond the reach of a large majority of students. We hope, therefore, that the figures of two hundred and fifty species, which appear in this work, will not be unacceptable to the American ich-

thyologist. They are taken for the most part from living specimens, and carefully colored on the spot. For those which are copied, due credit is given in the text, and the twelve last plates are almost entirely of this character. Where we have been unable to draw from a living specimen, and have been compelled to make use of a cabinet specimen, we have given merely an outline.

Exclusive of the fossil fishes, we enumerate in the work four hundred and forty species, comprised under one hundred and fifty-six genera and thirty-two families. Of these, two hundred and ninety-four species belonging to this State, or the adjacent waters, are accompanied by detailed descriptions. In preparing the following pages, we have endeavored to compress our descriptions within the shortest possible compass consistent with clearness. Had this been the only department entrusted to us, we should have dwelt more on the anatomical details, and perhaps have been more diffuse on the habits and peculiarities of species. Too little, however, is positively known of their habits, and that little is mixed up with too much of the marvellous, to render it desirable or profitable to introduce them here. When it is, moreover, recollected that we are to traverse through the whole animal kingdom, we would fain indulge the hope that this imperfect attempt to enlarge our acquaintance with a single class may be received with a favor proportionate to the difficulties and extent of the task.

J. E. DE KAY.

The Locusts, Queens County.
July 1, 1842.

LIST

OF

WORKS REFERRED TO IN THE DESCRIPTIONS OF THE FISHES.

Ac. Sc. Journal of the Academy of Natural Sciences of Philadelphia. 8vo. Philadelphia, 1817 et seq.

Alb. Inst. Transactions of the Albany Institute. 8vo. Albany, 1828–9.

Ann. Lyc. Annals of the Lyceum of Natural History of New-York. 8vo. New-York, 1824 et seq.

Am. Acad. Memoirs of the American Academy of Arts and Sciences. 4to. Boston, 1785 et seq.

Am. Phil. Transactions of the American Philosophical Society for promoting useful knowledge. 4to. Philadelphia, 1785 et seq.

Am. Month. Mag. The American Monthly Magazine and Critical Review, edited by H. Bigelow and O. L. Holley. 4 vols. 8vo. New-York, 1817 et 1818.

Blochii, M. E. Systema Ichthyologiæ Iconibus CX. illustrata, correxit J. G. Schneider. Berolini, 1801.

Akerly, S. Economical History of the Fishes sold in the Markets of New-York. (Am. Month. Mag. Vol. 2.)

Catesby, M. Natural History of Carolina, Florida and the Bahama Islands. Folio. London, 1731–43.

Clinton, De Witt. Some Remarks on the Fishes of the Western Waters of the State of New-York. Lit. and Phil. Soc. Vol. 1, p. 493.

" " Description of a new species of fish (Clupea hudsonia). Ann. Lyc. Vol. 1, p. 49, (figure.)

" " Account of the Otsego Basse. Med. and Phil. Register, Vol. 3, p. 188, (figure.)

Cuvier et Valenciennes. Histoire Naturelle des Poissons. 8vo. Paris, 1828 et seq. 16 vols. 1842.

Hitchcock, E. Report on the Geology, Botany and Zoology of Massachusetts. 8vo. Amherst, 1835. Catalogue of the Fishes.

Kirtland, J. P. Report on the Zoology of Ohio. 8vo. Columbus, 1838.

Latrobe. Description of the Clupea tyrannus, etc. Am. Phil. Soc. Vol. 5, p. 77, (figure.)

Lesueur, C. A. Descriptions of three new species of the genus Raia. Jour. Ac. Vol. 1, p. 41.

" Short descriptions of five (supposed) new species of the genus Murena. Ib. Vol. 1, p. 81.

" Descriptions of two new species of the genus Gadus. Ib. Vol. 1, p. 83.

" Description of a new species of the genus Cyprinus. Ib. Vol. 1, p. 85.

" A new genus of fishes proposed under the name of Catostomus, and the characters of this genus, with those of its species indicated. Ib. Vol. 1, pp. 88 and 102.

" Description of four new species and two varieties of the genus Hydrargira. Ib. Vol. 1, p. 126.

" Descriptions of several new species (Squalus, Salmo) of North American fishes. Ib. Vol. 1, pp. 222 and 359.

" Descriptions of several species of the genus Esox of North America. Ib. Vol. 1, p. 413.

LESUEUR, C. A. Description of a new genus, and of several new species of fresh water fish, indigenous to the United States. Ib. Vol. 2, p. 2.

" Descriptions of two new species of Exocetus. Ib. Vol. 2, p. 8.

" Observations on several genera and species of fishes belonging to the natural family of Esoces. Ib. Vol. 2, p. 124.

" Descriptions of five new species of the genus Cichla of Cuvier. Ib. Vol. 2, p. 214.

" Description of three new species of the genus Sciena. Ib. Vol. 2, p. 251.

" Description of a Squalus of a very large size, which was taken on the coast of New-Jersey. Ib. Vol. 2, p. 343.

" Description of two new species of the genus Batrachoid of Lacépède. Ib. Vol. 3, p. 395.

" Description of several species of the Linnean genus Raia of North America. Ib. Vol. 4, p. 100.

" Description of two new species of the Linnean genus Blennius. Ib. Vol. 4, p. 361.

" Description of several species of Chondropterygious Fishes of North America, with their varieties. Am. Philos. Soc. new series, Vol. 1, p. 380.

Lit. and Phil. Soc. Transactions of the Literary and Philosophical Society of New-York. 4to. 1815 et seq.

MEASE, J. Facts respecting the Rockfish or Streaked Bass (Labrax lineatus). Lit. and Phil. Soc. Vol. 1, p. 502.

Med. and Phil. Reg. The American Medical and Philosophical Register, edited by Drs. Hosack and Francis. 4 vols. 8vo. New-York, 1814.

MITCHILL, S. L. Report in part on the Fishes of New-York. 12mo. p. 28, New-York, January, 1814.

" Arrangement and Description of the Codfishes of New-York. Med. and Phil. Reg. Vol. 4, p. 618.

" Memoir on Ichthyology. Lit. and Phil. Soc. Vol. 1.

" The Fishes of New-York described and arranged. In a supplement to the memoir on the same subject in the Literary and Philosophical Society of New-York. Am. Month. Magazine, Vol. 2, pp. 240 and 321.

" Descriptions of three species of fish. Journ. Ac. Nat. Sc. Vol. 1, p. 407.

" Description of a new and gigantic species of the genus Cephalopterus. Ann. Lyc. Vol. 1, p. 23.

" Description of an extraordinary fish resembling the Stylephorus of Shaw. Ib. Vol. 1, p. 82.

" Description of the Raia erinacea or Hedgehog Ray. Am. Jour. Sc. Vol. 9, p. 290.

PARRA, ANTONIO. Descripcion de diferentes piezas de historia natural, las mas del ramo maritimo representadas en setento y cinco laminas. 4to. En la Havana, 1787.

PECK, W. D. Description of four remarkable fishes taken near the Piscataqua in New-Hampshire. Am. Acad. Vol. 2, part 2, p. 46, (figures.)

RICHARDSON, J. Fauna Boreali-americana, or the Zoology of the northern parts of British America. Part 3, the Fish. 4to. p. 327, London, 1836.

" Report on North American Zoology. (Report of the Sixth meeting of the British Association. 8vo. London, 1837.)

REDFIELD, W. C. Short notices of American fossil fishes. Am. Jour. Vol. 41.

REDFIELD, J. H. Fossil fishes of Connecticut and Massachusetts, with a notice of an undescribed genus. Ann. Lyc. New-York, Vol. 4.

SCHŒPFF, J. D. Descriptions of North American fishes chiefly from the waters of New-York. (Beobachtungen, &c. von der Gesellschaft naturforschender. Freunde zu Berlin zweiten bande, drittes stuck.) 8vo. Berlin, 1788.

SMITH, J. V. C. Natural History of the Fishes of Massachusetts, embracing a practical treatise on angling. 12mo. Boston, 1833.

STORER, D. H. Report on the Ichthyology of Massachusetts. 8vo. p. 202, Boston, 1839.

VALENCIENNES. Sur le sous-genre Marteau (Zygæna). Mem. du Mus. d'Hist. Nat. Vol. 9, p. 222.

WOOD, W. W. Descriptions of four new species of the Linnean genus Blennius, and a new species of Exocetus. Ac. Sc. Vol. 4, p. 278.

YARREL. History of British Fishes. 2 vols. 8vo. and Suppl. London, 1836.

SYNOPSIS

OF THE

NORTH AMERICAN FAMILIES AND GENERA OF FISHES DESCRIBED IN THIS WORK.

I. BONY FISHES.

A. PECTINIBRANCHII.

(*a*). *Spine-rayed.*

1. PERCIDÆ,	Perca, Labrax, Huro, Pileoma, Lucioperca, Serranus, Centropristes, Grystes, Centrarchus, Pomotis, Bryttus, Aphredoderus, Uranoscopus, Sphyræna, Boleosoma.
2. TRIGLIDÆ,	Trigla, Prionotus, Dactylopterus, Cottus, Hemitripterus, Scorpena, Sebastes, Uranidea, Aspidophorus, Cryptacanthodes, Gasterosteus.
3. SCIENIDÆ,	Corvina, Leiostomus, Otolithus, Umbrina, Pogonias, Micropogon, Hemulon, Pristipoma, Lobotes.
4. SPARIDÆ,	Sargus, Chrysophrys, Pagrus.
5. CHETODONTIDÆ,	Ephippus, Pimelepterus.
6. SCOMBRIDÆ,	Scomber, Thynnus, Pelamys, Cybium, Trichiurus, Xiphias, Naucrates, Elacate, Lichia, Trachinotus, Palinurus, Caranx, Blepharis, Argyreyosus, Vomer, Seriola, Temnodon, Coryphena, Lampugus, Rhombus, Pteraclis.
7. TEUTHIDÆ,	Acanthurus.
8. ATHERINIDÆ,	Atherina.
9. MUGILIDÆ,	Mugil.
10. GOBIDÆ,	Blennius, Pholis, Chasmodes, Gunnellus, Zoarces, Anarrhicas, Gobius.
11. LOPHIDÆ,	Lophius, Chironectes, Malthea, Batrachus.
12. LABRIDÆ,	Ctenolabrus, Tautoga, Xirichthys.

(*b*). *Soft-rayed.*

1. ABDOMINAL.

13. SILURIDÆ,	Galeichthys, Arius, Pimelodus, Amblyopsis.

14. CYPRINIDÆ, ... { Cyprinus, Gobio, Abramis, Labeo, Catostomus, Stilbe, Leuciscus, Pœcilia, Lebias, Fundulus, Hydrargira, Molinesia.
15. ESOCIDÆ, ... Esox, Belone, Scomberesox, Exocetus.
16. FISTULARIDÆ, ... Fistularia.
17. SALMONIDÆ, ... Salmo, Osmerus, Baione, Scopelus, Corregonus.
18. CLUPIDÆ, ... Clupea, Alosa, Chatœssus, Elops, Butirinus, Amia.
19. SAURIDÆ, ... Lepisosteus.

2. SUB-BRACHIAL.

20. GADIDÆ, ... Morrhua, Merlucius, Lota, Merlangus, Brosmius, Phycis.
21. PLANIDÆ, ... Hippoglossus, Pleuronectes, Achirus, Plagusia.
22. CYCLOPTERIDÆ, ... Lumpus, Liparis.
23. ECHENEIDÆ, ... Echeneis.

3. APODAL.

24. ANGUILLIDÆ, ... Anguilla, Conger, Ophidium, Fierasfer, Ammodytes.

B. LOPHOBRANCHII.

25. SYNGNATHIDÆ, ... Syngnathus, Hippocampus.

C. PLECTOGNATHI.

26. GYMNODONTIDÆ, ... Diodon, Tetraodon, Acanthosoma, Orthagoriscus.
27. BALISTIDÆ, ... Monocanthus, Aluteres, Balistes.
28. OSTRACIONIDÆ, ... Lactophrys.

II. CARTILAGINOUS FISHES.

D. ELEUTHEROPOMI.

29. STURIONIDÆ, ... Acipenser, Platirostra.

E. PLAGIOSTOMI.

30. SQUALIDÆ, ... { Carcharias, Lamna, Mustelus, Selachus, Spinax, Scymnus, Zygæna, Squatina, Pristis.
31. RAIIDÆ, ... Raia, Pastinaca, Myliobatis, Cephaloptera.

F. CYCLOSTOMI.

32. PETROMYZONIDÆ, ... Petromyzon, Ammocetes.

ERRATA.

[Owing to the absence of the author while these pages were being printed, several inaccuracies have occurred. The reader is requested to correct the following more important errors.]

Page 99, for "Pl. XXIII. fig. 74," read "Pl. XXIII. fig. 71."
100, for "Pl. XX. fig. 66," read "Pl. XX. fig. 56."
101, insert under "SPRING MACKEREL," "SCOMBER VERNALIS."
124, for "Pl. LXV." read "Pl. LXXV."
194, insert "Pl. LXXVII. fig. 243."
202, insert "Pl. LXXVII. fig. 242."
220, for "atricadua," read "atricauda."
231, for "Cyprilurus," read "Cypsilurus."
247, for "Pl. LX. fig. 198," read "Pl. LXXVI. fig. 240."
257, 28th line, for "spears," read "spars."
297, for "Pl. XLIII." read "Pl. XLVIII."
325, for "Pl. LV." read "Pl. LVI."

THE NEW-YORK FAUNA.

CLASS V. FISHES.

VERTEBRATED ANIMALS WITH COLD RED BLOOD; BREATHING BY GILLS THROUGH THE MEDIUM OF WATER; WITHOUT LUNGS. BODY COVERED MOSTLY WITH IMBRICATED SCALES OR PLATES, OR WITH A SMOOTH MUCOUS SKIN. MOVE IN WATER BY MEANS OF FINS INSTEAD OF FEET, WHICH VARY IN NUMBER. REPRODUCTION BY EGGS, WHICH ARE USUALLY FECUNDATED AFTER EXCLUSION. HEART UNILOCULAR, OR COMPOSED OF ONE AURICLE AND ONE VENTRICLE. HEAD VARIOUS; NO NECK. AQUATIC. CHIEFLY CARNIVOROUS.

Obs. The animals of this class are very numerous, and are readily distinguished from all others. About four thousand were assembled together by Cuvier when he first began to study them, but the actual number now known is supposed to reach double that amount.

Fishes have been divided into two great groups, viz. the Bony, and the Cartilaginous. The first comprises by far the greatest number of species.

SUB-CLASS I. BONY FISH.

Skeleton bony, the osseous matter being deposited in fibres. Sutures of the cranium distinct. With maxillary or intermaxillary bones, always one and generally both, present. Gill membrane with rays.

Section 1. Pectinibranchii.

Gills arranged in continuous rows like the teeth of a comb. Furnished with an opercle or gill cover, which is bordered with a loose membrane supported by rays. Jaws complete and free.

Obs. This section embraces two orders, characterized chiefly by the presence or absence of spinous rays.

ORDER I. SPINE-RAYED.

The first rays of the dorsal fin, or the entire first dorsal when two are present, with simple spinous rays. The first ray of the anal fin always spinous, and the ventral fins have also one or more of the anterior rays almost universally spinous.

Obs. This order, which is designated in ichthyological works under the name of *Acanthopterygii*, comprises seventeen families. In the waters of this State, we have the representatives of ten families. We commence with

FAMILY I. PERCIDÆ.

Edges of the opercle or gill-cover, or of the preopercle (anterior gill-cover), and sometimes both, denticulated, or armed with spines. The cheeks not cuirassed. Both jaws, the vomer and palatine bones, armed with teeth.

Obs. A family rich in species, amounting nearly to six hundred; a number of species greater than is to be found in the last edition of Linneus, including the whole class of fishes. The genera of this family alone are fifty-five in number, nearly equalling the genera employed by Linneus for his entire class.

The characters assigned above are sufficiently distinctive, but we may here add, in more general terms, the following remarks on this family: Body oblong, more or less compressed; covered with scales, generally hard, with their exposed surfaces roughened, and their free edges denticulated or serrated. Mouth moderately large. Gills well divided, and their membranes sustained by several rays, never less than five, and rarely above seven. Teeth in the jaws on a transverse line in front of the vomer, and almost invariably a longitudinal band on each palatine, and rounded patches on the pharyngeals; occasionally on the tongue. No barbules, nor cirri or beards. Ventral fins for the most part under the pectorals; occasionally in advance of it; and in a few genera only, are they abdominal, or behind the ventrals.

This family is remarkable for their beautiful forms, and the excellence of their flesh as an article of food. About one-fifth of the whole number of species inhabit fresh-water streams, or occasionally ascend them; and it is observable that some genera, which contain chiefly marine species, have a few fluviatile species, while the facts are reversed in other genera.

All the fishes of this family, found in the United States or along its shores, are included by Cuvier in his great work under the following genera, containing in the aggregate about forty species:

PERCA,	CENTROPRISTES,	DULES,
LABRAX,	GRYSTES,	ASPREDODORUS,
HURO,	POMOTIS,	URANOSCOPUS,
LUCIOPERCA,	CENTRARCHUS,	SPHYRÆNA.
SERRANUS,	BRYTTUS,	

To these we have ventured to add indications of three others.

GENUS PERCA.

Body oblong, subcompressed. Ventrals beneath the pectorals. Gill membrane with seven rays; opercle spiny; preopercle with the posterior and basal margins toothed. Scales rough, not easily detached. Five soft rays to the ventral fins. Two dorsals, or so deeply notched as to appear double. Teeth all minute, equal. Suborbital faintly serrated. Tongue smooth.

THE AMERICAN YELLOW PERCH.

PERCA FLAVESCENS.

PLATE I. FIG 1.

Morone flavescens. MITCHILL, Report on the Fishes of N. Y.
Bodianus flavescens. ID. Trans. Lit. and Phil. Soc. N. Y. Vol. 1, p. 421.
La Perche jaunâtre d'Amérique. CUV. et VAL. Hist. des Poissons, Vol. 2, p. 46.
The American Perch. RICHARDSON, Fauna Boreal. Amer. Vol. 3, p. 1, pl. 74.
The Common Perch. STORER, Massachusetts Report, p. 5.
The Yellow Perch. KIRTLAND, Report on Zoology of Ohio, p. 168 and 190.

Characteristics. Sides yellow; six to eight dark vertical bands over the back. Pectorals, ventrals and anal, orange. Length 6 – 12 inches.

Description. Body compressed, elongated, with a somewhat gibbous dorsal outline. Scales small, adherent, ciliated on their free edges. Head above, and between the eyes, smooth. Lateral line, a series of tubes concurrent with the line of the back. Head sub-depressed; and in the larger and older fish, the rostrum becomes more elongated, producing a concavity in the facial outline. The first dorsal commences above the base of the pectorals. The first ray much shorter than the second; the fourth, fifth and sixth rays longest, thence gradually diminishing to the last, which is very short. The space between the first and second dorsals is about 0·3 in extent. The second dorsal is composed of fifteen or sixteen rays; the first two short and spinous; in many individuals, there is but one spinous ray. The remaining rays are articulated, branched, very gradually subsiding from the anterior part. Pectorals moderate; posterior margin slightly rounded, and composed of fifteen articulated

rays. Ventrals slightly behind the pectorals. Anal beneath the second dorsal, of two spinous and eight articulated rays; the first spinous ray shorter than the second. Caudal forked, or rather notched, with the tips somewhat rounded. Mouth moderate; jaws even. Preopercle strongly toothed. The opercle serrated beneath, and with a spine on its posterior angle. Humeral bones grooved.

Color. Above greenish and gold, with dark olive green. Vertical bands across the back, usually longest about the middle of the body, and gradually smaller towards the tail. Chin flesh-colored. Sides and abdomen golden yellow. Ventrals and anals bright orange. Pectorals yellowish orange. Dorsals and caudal dusky brown; the anterior dorsal tinged with light yellow, and with dark brown dashes along its length above the base of the fin. Pupils black; irides golden.

Length, 6·0 – 12·0.
Fin rays, D. 13.2.15; V. 1.5; A. 2.8; C. 17 $\frac{5}{5}$.

The common Yellow Perch is one of the best known and widely distributed of all our fluviatile fishes. It may be considered as a northern fish, extending to the fiftieth parallel. Its geographical distribution has been much extended within a few years, by the artificial water channels created by the enterprise of several of our sister republics. Thus, in the State of Ohio, it was common in the small lakes in the northern parts of the State only, and in Lake Erie. Since the construction of the Ohio canal, we learn from Kirtland that it has found its way into the Ohio river, and may soon be observed in the Mississippi. It is common in almost every pond and stream throughout the northern and middle States, and in all the great lakes. It is very closely allied to the *P. fluviatilis* of Europe; and like that fish, is much esteemed by those who can not obtain salt-water species. It has occasionally been transported from one pond to another, with complete success. In 1790, Dr. Mitchill transferred some of them from Ronkonkama to Success pond, a distance of forty miles, where they soon multiplied. In 1825, a similar experiment was made by transporting perch from Skaneateles to Otisco lake and Onondaga lake. In this latter case, the perch increased remarkably; while pickerel, which were introduced at the same time, did not appear to thrive as well. The common dace and eel pout have also been transferred with complete success. They vary considerably in size in different localities. I have caught them in Otsego lake, weighing nearly three pounds, and have heard of them exceeding this weight. Cuvier has described two or three other species, which seem scarcely distinguishable from the perch just described.

THE ROUGH YELLOW PERCH.

PERCA SERRATO-GRANULATA.

PLATE XXII. FIG. 64.

La perche à opercules grenus. CUV. et VAL. Hist. Poiss. Vol. 2, p. 47.

Characteristics. With roughened radiated lines on the head. In other respects, resembling the preceding species.

Description. I have applied this name to a yellow perch from Rockland county, which appeared to present the characters assigned to it by Cuvier. I have nothing to add to the description given by that author. It is thicker than *P. fluviatilis;* its cranium larger, and with roughened radiating striæ. The opercle has likewise roughened radiating striæ, and is strongly toothed on its lower margin; its upper lobe almost effaced, but its point is very acute. In some individuals, the preopercle is smooth on two-thirds of its height, and has only a few near the angle; whilst in others, there are teeth throughout the whole extent. Those on the lower margin are always more minute and numerous than in the European species. The subopercle is toothed on two-thirds of its margin.

Length, 6·0 – 12·0.
Fin rays, D. 14.2.13; P. 13 or 14; V. 1.5; A. 2.7; C. 17.

The colors offer nothing essentially different from those of the preceding species, except that the dark blotches on the first dorsal are scarcely visible.

THE ROUGH-HEADED YELLOW PERCH.

PERCA GRANULATA.

PLATE LXVIII. FIG. 220.

La perche à tête grenue. CUV. et VAL. Hist. Poiss. Vol. 2, p. 48, pl. 9.

Characteristics. Head roughened by granulations, disposed in radiating striæ on the parietals. A black spot on the four last rays of the first dorsal.

Description. Teeth of the vomer more robust than in *P. fluviatilis.* Scales nearly smooth on their margins: The opercle feebly striated, and with few dentations. Six distinct and well defined bands. If the figure may be trusted for its coloring, the lower half of the ventrals, and the whole caudal, are blood red. The vent is near the anal fin.

Fin rays, D. 15.2.13; P. 15; V. 1.5; A. 2.8; C. 17.

I have never met with this species, and insert it on the authority of Cuvier, who received it from New-York through MM. Milbert and Lesueur.

THE SHARP-NOSED YELLOW PERCH.

PERCA ACUTA.

PLATE LXVIII. FIG. 222.

La Perche à museau pointu. CUV. et VAL. Hist. Poiss. Vol. 2, p. 49, pl. 10.
The Sharp-nosed Perch. RICHARDSON, Fauna Bor. Am. Vol. 3, p. 4.

Characteristics. With seven dark bands, between which are an equal number of spots or irregular bands.

Description. Lower jaw elongated; snout pointed. Minute dentations on the preopercle, and even on its lower edge; a few, moderately strong, on the preopercle, immediately beneath its point. The last ray of the first dorsal, and the first of the second dorsal, very short. The vent nearly equidistant between the ventral and anal fins.

Color. Seven dark vertical bands descending on the sides; and between them, seven half bands more or less regular, or merely spots on the dorsal region.

Length, 8·0.
Fin rays, D. 13 or 14.2.14; P. 14; V. 1.5; A. 2.7; C. 17.

Sent to Cuvier from Lake Ontario.

THE SLENDER YELLOW PERCH.

PERCA GRACILIS.

La Perche grêle. CUV. et VAL. Hist. des Poissons, Vol. 2, p. 50.

Characteristics. Body elongated, with a small black spot on its first dorsal. Opercle not dentated. Length four inches.

Description. Body less elevated than in the preceding species, and its facial outline less concave. No dentations on the opercle, and those on the preopercle very minute. Spinous ray of the second dorsal extremely feeble and short. Its bands and half bands as in the preceding, but less unequal among themselves.

Length, 4·0.
Fin rays, D. 12.1.13; P. 12; V. 1.5; A. 2.8; C. 19.

This species was obtained from Skaneateles lake, Onondaga county, by Cuvier. It is doubtless mixed there with the true Yellow Perch, of which I have obtained specimens from that lake.

EXTRA-LIMITAL.

P. nebulosa. (HALDEMAN, Ac. Sc. Vol. 8, p. 330.) Body slender, slightly compressed; scales small, strongly serrated; tail truncated; pectorals very long; branchial rays 6; lateral line straight; yellowish brown, with dark transverse bands. D. 14.15; P. 14; V. 7; A. 11; C. 18. Length 5·5. *Susquehannah River.*

P. minima. (ID. ib. p. 330.) Spots instead of bands. Dorsal with nine rays. Length 2·0. *Susquehannah.*

OBS. Both these species are arranged by Mr. Haldeman under a subgenus of Percidæ, which he terms *Percina*, characterized by six branchial rays; preopercle smooth on its margin; opercle ends in a spine, and with the cheeks scaly; teeth all fine, and placed on the maxillaries and vomer.

GENUS LABRAX. *Cuvier.*

A disk or bands of teeth on the tongue. Suborbital and humerus without denticulations. Two points on the opercle. Two dorsal fins distant and separated. Teeth on both jaws, on the vomer and palatines. Cheeks, preopercle and opercle scaly. Preopercle notched or denticulated below, serrated behind.

THE STRIPED SEA BASS.

LABRAX LINEATUS.

PLATE I. FIG. 3. — (STATE COLLECTION.)

Sciena lineata. BLOCH, pl. 304.
Perca, Rock-fish, Striked Bass at New-York. SCHOEPFF, Beobachtungen, etc. p. 160.
Perca saxatilis. BLOCH, SCHNEID. p. 89.
P. septentrionalis. ID. p. 90, pl. 20.
Centropome rayé. LACEPEDE, Hist. Nat. des Poissons, Vol. 4, p. 255.
Roccus striatus. MITCHILL, Report in part on the Fishes of New-York, p. 25.
Perca mitchilli. ID. Trans. Lit. and Phil. Society of New-York, Vol. 1, p. 413, pl. 3, fig. 4.
Rock-fish. MEASE, Ib. Vol. 1, p. 502.
Le Bar rayé, Labrax lineatus. CUV. et VAL. Hist. Poiss. Vol. 2, p. 79.
The Striped Bass, L. lineatus. STORER, Massachusetts Report, p. 7.

Characteristics. Brown above, silvery beneath. From seven to nine blackish longitudinal stripes on each side of the body. Length from one to four feet.

Description. Body cylindrical, tapering. Head and body covered with large adhesive scales. Lateral line obvious, running through the fourth stripe and nearly straight. Head somewhat obtusely pointed. Eyes large, and about two diameters apart. Nostrils double, the posterior largest. Gill openings ample. Lower jaw longest. Teeth numerous in the jaws and palatines. Teeth on the tongue most obvious on its sides. Opercle with two spines on its posterior margin, of which the inferior is largest. Preopercle finely denticulated along its lower margin. The first dorsal commences behind the pectoral, and above the latter rays of

the ventral fins: it is composed of nine spinous rays, of which the first is very short, the second longer, the third and fourth longest, subequal; thence rather suddenly decreasing to the last. A simple ray is interposed in the very short interval between this and the second dorsal, which is composed of twelve branched rays. The first branched ray is longest; the others gradually become smaller to its termination, which is anterior to the end of the anal fin. The pectoral fins arise a short distance behind the branchial aperture; are short, obliquely subtruncate, and composed of sixteen rays. The ventral fins originate slightly behind the pectorals, with the first ray short, robust and spinous. The anal fin arises under the fourth ray of the second dorsal; the three first rays are short, spinous and robust. The portion with branched rays resembles in shape the second dorsal, but extends beyond it. Caudal fin broadly lunate.

Color. Bluish-brown or bluish above, silvery on the sides and beneath. Along each side are from seven to nine inequidistant black parallel stripes; the upper series of stripes proceed directly to the base of the caudal fin, the lower ones terminate above the anal. These stripes are occasionally indistinct, sometimes interrupted in their course, and more rarely each alternately a continuous stripe, and a row of abbreviated lines or dots. Pupils black; irides silvery.

Length, 6·0 – 48·0.
Weight one to seventy pounds, and even more.
Fin rays, D. 9.1.12; P. 16; V. 1.5; A. 3.11; C. 17 $\frac{3}{3}$.

This is a pretty generally distributed species among us, and affords a savory article of food. They take the hook with great freedom, and afford much sport to the angler. They are more frequently, however, taken with the seine. They may be seen in our markets during the whole year; and although the larger fish may be considered as coarse and dry, yet the smaller ones are exceedingly delicate eating.

The geographical limits of the Striped Bass appear to extend from the capes of Delaware bay to the coast of Massachusetts. I am strongly inclined to suspect the *Bar-fish* of Richardson to be merely the first Var. *P. mitchilli, interrupta*, of Mitchill, characterized by rows of spots, five above and five below; the lateral line so regularly interrupted and transposed as to appear like "ancient church music." Mitchill's variety has "the parallelism of the lines "broken; and their integrant parts, the specks and spots, resemble confused rows of printing "types." Should the supposition of their identity be correct, the geographical range of the Striped Bass extends from Delaware bay to the Gulf of St. Lawrence.

Dr. Mitchill has truly and concisely remarked that this bass is a salt-water fish, ascending fresh-water streams to breed during the spring, and for shelter during the winter. According to the observations of Mease, they make their appearance along the coast in large scholes,*

* *Schole*, a word of Saxon origin, denoting a company of fish, and frequently corrupted into *school* and *shoal*. We take this occasion to state that the word *bass* is probably of Dutch origin, and applied to sea perches; and it appears to have been adopted into our language anterior to the time of Willughby. In itself, it may have been corrupted from *paartch* or *perch*.

about the beginning of September. They keep between the outer bar and the beach, where they are caught by the seine in large quantities for the New-York and Philadelphia markets. From the same writer, we learn that they ascend rivers as far as the depth of water will permit, and lie among the bushes. Sometimes, from heavy rains, or the sudden melting of snow, the fish are forced from their abode back again to the salt water, and remain there until the freshet subsides, when they invariably reäscend. They ascend high up the Hudson river, and have been taken under the Cohoes falls of the Mohawk. The larger individuals, called *Green-heads*, never ascend fresh-water streams. Along the coast, they enter creeks and inlets at night with the flood tide, in order to feed, and return with the ebb. Advantage is taken of this circumstance, by stretching a seine across the outlet, when great numbers are taken. As the weather grows colder, they penetrate into bays and ponds connected with the sea, where they imbed themselves in the mud. Near Sag-harbor, Suffolk county, I noticed one of these ponds, which was a source of great annual profit to the owner.

This species, it will be noticed above, has had the fortune to receive many names. Dr. Mitchill, who was unacquainted with the labors of his predecessors, imposed upon this species, with characteristic simplicity, his own name. It is known under the various popular names of *Striped* and *Streaked Bass*, *Rock-fish*, and oftener *Rock*.

Schœpff observes of this species, that "it is very common, and caught during the whole "year on the coast of New-York. They are brought into the market (dead) in great abun- "dance during the winter." "There are other fish in the same waters, which in shape, size "and color, completely resemble the striped bass, except that they have no lateral stripes "whatever. It is supposed that they are the same, and that they do not, until they are two "or three years old, take those stripes which sufficiently distinguish them from all others. "The linnean characters of *Perca aspera* apply to the above named fish, but it is clearly a "new species." It is probable, that in the latter paragraph, Schœpff alludes to some species of *Pogonias*.

From the avidity with which the striped bass seizes a hook baited with soft crab, clams, and the smaller crustacea, it is probable that they form no inconsiderable portion of its food.

THE RUDDY BASS.

LABRAX RUFUS.

PLATE III. FIG. 7. — (STATE COLLECTION.)

Perca, River Perch at New-York. SCHŒPFF, Beobachtungen, &c. 1788, p. 159.
Morone rufa. MITCHILL, Report in part, p. 18.
Bodianus rufus. ID. Phil. Tr. Vol. 1, p. 420.
Le petit Bar d'Amérique, Labrax mucronatus. CUV. et VAL. Hist. Poiss. Vol. 2, p. 86, pl. 12.
Labrax mucronatus. STORER, Massachusetts Report, p. 8.

Characteristics. Dark bluish above, with a reddish hue over the whole body, fading into a reddish on the sides; no lateral stripes. Length eight to ten inches.

Description. Body deep, compressed. Dorsal outline somewhat gibbous. Head small, with a sloping facial outline. Nostrils double, the posterior much the largest. Scales denticulate; all minutely punctured. Lateral line distinct, and nearly concurrent with the dorsal outline. Scales on the suborbital and opercle. Preopercle serrate on its posterior and inferior margins. Opercle with a flat acute point beneath, and a more obtuse one above, separated from each other by a deep emargination; its edge membranous. A deep straight suture behind the orbit. Upper jaw protractile; a band of minute teeth on the lower jaw and intermaxillaries. Tongue subacute, punctate with black, smooth in the centre and at the tip; a band of velvet-like teeth on the sides. The two dorsals connected by a slight membrane. The first dorsal composed of stout spines, more or less curved; the first very short, the second twice its length, and the third still longer; the fourth and fifth longest of all. The second dorsal longer than high; the first ray straight, spinous, about two-thirds of the length of the next branched rays: the form of this fin is quadrangular, the rays diminishing very gradually in length to the last. Pectorals broad; the upper rays longest. Ventrals in advance of the origin of the first dorsal; its first ray stoutly spinous. Anal fin with three spines, the first of which is very short, and capable of being directed forwards. Caudal fin deeply emarginate.

Color. Dark bluish above, with a reddish hue over the whole, fading into yellowish or orange on the sides. Head with brilliant metallic reflections. Lips and chin rosaceous. The base of the pectorals dark brown, the fins themselves being yellowish. Ventrals reddish at their bases; the remaining fins brown.

Length, 8·0 – 10·0. Depth, 2·0 – 3·0.
Fins, D. 9.1.12; P. 15; V. 1.5; A. 3.10; C. 17 $\frac{3}{3}$.

This is a very common fish in our markets during the winter months, and early in the spring. They come into our markets from New-Jersey and Long Island, where they are obtained in brackish streams. Dr. Akerly, in his economical history of the fishes sold in the New-York markets, states that it is only fit for chowder. I have very little doubt but that is the species described by Schœpff; and as his memoir on the fishes of New-York is not easily attainable in this country, and has never been translated, the following notice of this species may be acceptable to our ichthyologists.

"PERCA — *Perch, River Perch at New-York.*

"Head sloping; front scaly. Nostrils two, the largest near the inner angle of the eye. Eyes yellow. Upper jaw movable; the under somewhat projecting. In both jaws, and in the fore part of the palate, are small bristly teeth. Tongue oblong, triangular, rounded at the point, and rough on both edges. Gill covers scaly; the upper dentate on its margin. Br. rays 7. Body compressed, oblong, and broadest between the first rays of the dorsal and the ventrals. Back brown, changing to blue and green. Belly white and shining. The under lip, throat, gill membranes (often the pectoral and anal) red: this is occasioned by the blood shining through the tender membrane. Tail trifurcate. Ventrals placed at the extremity of the breast bone. Lateral line straight. All the scales fringed on their margins (ciliatæ). Dorsals two. D. 9.13; P. 15; V. 1.6; A. 3.12; C. 18.

"This perch, which nearly equals in size our river perch, inhabits the coast of New-York and Long Island, in and at the mouths of fresh-water streams. It wants the six black lines and the black mark at the end of the dorsal, which characterize the European fresh-water perch. The first dorsal, moreover, has but thirteen (nine?) rays."

THE LITTLE WHITE BASS.

LABRAX PALLIDUS.

PLATE I. FIG. 2. — (STATE COLLECTION.)

Morone pallida. MITCHILL, Report on the Fishes of N. Y. p. 18.
Bodianus pallidus. ID. Trans. Lit. and Phil. Soc. N. Y. Vol. 1, p. 420.

Characteristics. Body compressed, small, light-colored. First ray of the posterior dorsal nearly as long as the second. Opercle with a single spine. Length 3 – 4 inches.

Description. Body much compressed. The back, anterior to the dorsal fin, carinate; head declivous; scales rounded, minutely pectinate, readily detached, extending over the cheeks and to the interobital space. Lateral line concurrent with the back. Nostrils double; the posterior obliquely ovate. Fine velvet teeth on the maxillaries, intermaxillaries and palatines; and with a strong lens, a band of teeth may be traced on each edge of the tongue. Opercle with a single flat spine, and a pointed membrane extending beyond it. Preopercle angular, serrated. Interopercle with a minute flattened spine; humerus without a spine. Dorsal apparently double, but connected by a low membrane: the anterior portion consists of nine spinous rays, of which the fourth is longest; the first very short, the second and eighth subequal. The first ray of the posterior portion spinous, long, nearly equalling in height the first branched ray; the upper margin of this fin descends more abruptly than in the preceding species. Pectorals placed just anterior to the origin of the ventrals, feeble; the first ray short and rudimentary, the second long and simple, the remainder branched. Ventrals situated beneath the first rays of the dorsal fin; its first ray spinous, shorter than the second, third longest. Anal fin with three spinous rays, of which the first equals in length the first ray of the anterior dorsal; the second and third more than double the length of the first. Caudal fin deeply emarginate. Air-bladder simple.

Color. Light bluish above, and paler beneath; sides and abdomen white. Base of the ventrals and anal fins faint pinkish. Some of the scales dark-colored, so as to represent a few irregular, interrupted horizontal bands along the sides; this appearance, however, is scarcely perceptible when the fish is just drawn from the water.

Length, 4·5. Depth, 1·5.
Fins, D. 9.13; P. 17; V. 1.5; A. 3.7; C. 17 $\frac{3}{3}$.

This pigmy bass is commonly known with us under the name of *White Perch.* I have the authority of Dr. Mitchill himself for the identity of the species. There are, however, several grave errors in his description, some of which he assured me were typographical. I am inclined to suspect that it has been confounded by preceding writers with the *mucronatus* just described. Cuvier's figure of this last named species agrees better with the *pallidus*, with the exception of the first ray of the second dorsal, which is represented as short; while the description, "L'épine de sa seconde dorsale est presque aussi longue que le premier rayon "mou qui la suit," corresponds entirely with the characters of the White Perch. There are other discrepancies, such as the want of ciliæ or dentations to the scales, which scarcely apply to either species. Like the preceding species, it inhabits salt and brackish waters; but as far as my observations have extended, is invariably a smaller species, being in fact a diminutive fish, and rarely brought to market for food. It occurs only in the spring, while the *Ruddy Bass*, or *Salt-water Perch* as it is sometimes called, is very robust, and is common throughout autumn and winter. The *Little White Bass*, or *White Perch*, may be readily distinguished from the other by its light color, small size, and very compressed body.

THE SMALL BLACK BASS.

LABRAX NIGRICANS.

PLATE L. FIG. 160. — (STATE COLLECTION.)

Characteristics. Dark colored, with a tinge of yellowish. First dorsal more elevated than the second. Length, 6 – 10 inches.

Description. Body compressed; back elevated. It has the general form of the Yellow Perch, but the frontal outline is more abruptly descending. Scales subquadrate, rounded behind, and minutely denticulated on their free margins (see figure). They extend over the opercular bones and suborbital, rising upon the soft rays of the dorsal, anal and caudal fins; on the nape, they extend anterior to the eyes. Lateral line very distinct, and nearly concurrent with the dorsal outline, from which it is distant about one-third of the depth of the body. Eyes very large, and near the facial outline. In a preserved specimen, a straight suture is observed extending backwards from the eye towards the upper portion of the branchial aperture. This is not visible, or but indistinctly, in the living individual. The upper portion of the orbit prominent. Nostrils double: the posterior obliquely oval, largest; the anterior round, and furnished with a valvular membrane. Preopercle with its angle rounded, and strongly serrate on its horizontal and ascending margins. Opercle with a flat spine or point, separated by an emargination from an indistinct point above it. On the posterior part of the opercle, is a distinct vertical bony suture, near the ascending branch, and parallel with the preopercle. A band of velvet-like teeth in the upper and lower jaws; a semilunar patch of teeth on the vomer; a narrow band on the palatines, and a group of similar teeth on the pharyngeals. Tongue broad, and punctate with black, with rounded patches of excessively minute teeth on its sides and tip. The first branchial are pectinate.

The first portion of the dorsal fin stoutly spinous; the first ray very short; the second as high again; the third, fourth and fifth highest: in individuals of a small size, the fourth ray is highest. The spinous portion is connected with that behind by a low membrane; its first ray is long and spinous, the remaining rays branched, and ending a short distance before the termination of the anal: the upper edge of this fin emarginate. Pectoral fins long and narrow, arising anterior to the origin of the first dorsal fin, and its tip extending as far back as the eighth spinous ray of that fin. Ventral fins stout and broad; the first ray spinous, the second ray with a short filament. Anal fin emarginate, with three spinous rays, the first very short; the first four branched rays longer than the last spinous ray. Caudal fin furcate; its tips subacutely rounded.

Color. The general hue is deep brownish-black, more intense on the head and upper part of the body. In the older specimens, there is a strong brassy hue throughout; occasionally dark longitudinal parallel streaks on the upper part of the body. Pupils black; irides yellow. Base of the fins light greenish-yellow; edge of the membrane of the spinous dorsal black. Upper portion of the membrane of the posterior dorsal fin transparent, and separated from the yellow portion at the base by a tolerably well defined dark band. Membrane of the anal fin dark towards the tips of the rays.

Length, 6·0 – 12·0. Depth, 1·5 – 3·5.
Fins, D. 9 or 10.1.12; P. 16; V. 1.5; A. 3.8; C. 15 $\frac{3}{3}$.

This species, which is apparently undescribed, is commonly known under the name of *Black Perch*, and is found in various deep fresh-water ponds in Queens and Suffolk counties. When weighing one or two pounds, they are esteemed good eating. They, however, rarely reach this size, being for the most part about six inches in length. Individuals have, however, been taken fifteen inches long. They rise to the fly, and afford much amusement to the sportsman.

THE WHITE LAKE BASS.

LABRAX ALBIDUS.

PLATE LI. FIG. 165.

Characteristics. Bluish white, with a few narrow dusky lines. Anal fin with twelve soft rays. Second dorsal scarcely emarginate. Length 10 – 15 inches.

Description. Body compressed; back arched; the portion anterior to the dorsal fin convex to the nape, where it becomes slightly concave, with the rostrum produced. Scales extending over the opercular pieces to the interorbital space, and on the base of the second dorsal, pectoral, anal and caudal fins. The scales (see figure) are large, subquadrate, rounded and ciliated on the free margins, reticulated on the exposed surface; truncated in front with fourteen radiating plaits on the concealed portion. Lateral line rather straight, not concurrent

with the dorsal outline. Head small and pointed. Eyes large, 0·5 in diameter, and slightly more than their diameters apart. Nostrils double, contiguous, vertical, slightly in advance of the orbits. Suborbital scaly. Preopercle with about fifty stout teeth on the posterior margin, more robust on the rounded angle, smooth beneath. Opercle with two small spines separated by a deep notch, which is filled up by membrane. Lower jaw slightly longest; both with bands of small subequal acute teeth: similar, but smaller teeth on the vomer and palatines; a small oblong patch of minute teeth on each side of the tongue, and a larger rounded patch of similar teeth at its base.

The first dorsal fin composed of nine spinous rays, arising at a point vertical to the origin of the ventral: the first spine short, not exceeding a quarter of an inch in length; the second twice the length of the first; the third more than twice the length of the second; the fourth and fifth subequal, longest; thence gradually diminishing in size to the last, which is more slender and rather longer than the first. The second dorsal arises a short distance behind, and perfectly distinct from the first; composed of one spinous and thirteen branched rays. The spinous ray is robust, and half the length of the first articulated ray, which, with the two following, are longest; the last ray longer than the two or three preceding: this is not faithfully rendered in the figure. Pectoral fins small, pointed, of seventeen rays; the upper simple, short; the third and fourth longest. Ventral fins slightly behind the base of the pectorals, robust, with one stout sharp spine and five branched rays; the tips with a tendency to filamentous. Anal slightly emarginate, with three spinous and twelve branched rays; these rays, as well as those of the second dorsal fin, have elongated scales extending towards the tips. The first spine is short, the second twice the length of the first, and the third rather longer than the second, but not more than half the length of the first soft ray. Caudal fin deeply lunate, with scales ascending high on the rays.

Color. Bluish white above the lateral line, with a few narrow parallel dusky streaks above and beneath this line. Sides and belly white. Pupils black; irides white, intermixed with a little brown. Dorsal, caudal and anal fins brownish, tinged with blue. Pectoral fins whitish, tinged with olive green. Ventral fins light transparent bluish, tipped with white.

Length, 10·5. Depth, 3·0.
Fins, D. 9.1.13; P. 17; V. 1.5; A. 3.12; C. 17 $\frac{3}{3}$.

This is a very common fish in Lake Erie, and is known at Buffalo under the name of *White Bass*. It readily takes the hook, and is esteemed as an article of food.

(*EXTRA-LIMITAL.*)

L. notatus. (Richardson, F. B. A. p. 8.) Ten parallel series of lines, forming regularly abbreviated spots. D. 9.1.12; V. 1.6; A. 1.12; C. 17. Length one to two feet. *River St. Lawrence.*

L. multilineatus. (Cuvier & Valen. Vol. 3, p. 488.) Sixteen longitudinal lines along the sides. D. 9.1.13; P. 14; V. 1.5; A. 3.12; C. 17. Length 15 inches. *River Wabash.*

GENUS HURO. *Cuvier.*

With most of the characters of the Genus PERCA, *but wanting denticulations on the bones of the head, and more especially on the preopercle. Opercle with two small flat points.*

THE BLACK HURON.

HURO NIGRICANS.

PLATE LXIX. FIG. 224.

Huro nigricans. CUV. & VAL. Hist. des Poissons, Vol. 2, p. 124, pl. 17.
Perca (Huro) nigricans. RICHARDSON, Faun. Boreal. Am. Vol. 3, p. 4.

Characteristics. Back and sides dark, with a faint greyish longitudinal streak through each row of scales. Length sixteen inches.

Description. General form that of the Perch. Greatest depth of the body under the first dorsal, and equal to one-third of the length of the body. Scales large, smooth, covering the head as far as the orbit, and extending also on the opercles. Lateral line tubular, concurrent with the dorsal outline. Head flattened above, with striæ diverging to the orbits. Lower jaw directed obliquely upwards, and projecting 0·25 beyond the upper. Velvet-like teeth on the jaws, vomer and palatines. Tongue ——. The bony opercle has an acute oblique notch on its posterior margin, producing two thin points. The branchial membrane, according to Cuvier, with seven rays. Richardson enumerates but six. The first dorsal small; its third ray longest, the fourth and fifth nearly as long. The second dorsal an inch behind the first, and one-third higher; the two first rays spinous, short; the first ray articulated, simple; the remainder branched. In the only specimen hitherto examined, the rays of this fin were injured, but Cuvier supposes that there must have been twelve or thirteen: only eight were visible. Pectorals with the first ray very short. Ventrals immediately beneath them. Anal, with its branched rays, equal in height to those of the second dorsal. Caudal slightly emarginate, with its tips rounded.

Color, taken from a dried specimen. Back and sides dark, with a faint longitudinal streak through the centre of each row of scales. Belly yellowish white.

Length, 17·5.
Fins, D. 6.2.8 or 12; P. 15; V. 1.5; A. 3.11; C. 17 $\frac{1}{1}$.

This is a remarkably firm and well-flavored fish, taken readily with the hook during the summer months in Lake Huron, where it is called *Black Bass.* It will probably be found in Lake Erie, and of course within the limits of the State. As I have not seen it, I have availed myself of the description and figure given by Cuvier and Valenciennes. Its history is yet imperfect; nor, with our present knowledge, can we assign it positively its proper place in the family.

GENUS PILEOMA.

With two distinct dorsals. Preopercle smooth. Opercle pointed, with a feeble flattened spine. Ventrals with five soft rays. Teeth uniform in size.

Obs. In order to prevent confusion, I have deemed it proper to place this small species in a separate group; believing, with Cuvier, that such a course is to be preferred, rather than to change the characters of another genus in order to force it into a group to which, in other respects, it may be a total stranger. I am unable to satisfy myself as to its true position in this family, but its smooth opercle would seem to indicate its vicinity to the genus *Huro*.

THE CHAMPLAIN PICKERING.

PILEOMA SEMIFASCIATUM.

PLATE L. FIG. 162. — (STATE COLLECTION.)

Characteristics. Small. Olive green, with numerous bands of a darker hue over the back. Length two to four inches.

Description. Body oblong, cylindrical. Scales moderate, denticulated, very small on the preopercle, larger on the opercle, nearly uniform on the remaining parts of the body; thirteen rows above and eight below the lateral line, enumerated in the centre of the body. Lateral line distinct and nearly straight. Head small, sloping. Eyes rather large, with the supra-orbital margins prominent. Branchial membrane with seven flattened rays. Preopercle nearly rectangular, smooth. Opercle terminating in a soft flat point; just anterior to this point, is a small flat spine. Lower jaw shortest; gape moderate. Jaws armed with feeble subequal teeth; indistinct vestiges of teeth on the vomer and palatines, more manifest on the pharyngeals.

The first dorsal fin commences above the base of the ventrals, and is composed of eleven subequal spinous rays, the posterior rays gradually diminishing in length. At an interval of 0·2, commences the second dorsal, higher than the first, and containing fifteen branched rays. Pectoral fins broad and rounded. Slightly behind this fin, arises the ventral, which is long and pointed. Anal fin longer than high, originating a little behind the commencement of the second dorsal, and composed of twelve annulated rays. Caudal broad, and very slightly emarginated; in some individuals, nearly even.

Color. The general hue is pale greenish-olive, becoming lighter towards the abdomen. A series of about twenty dark olive or brownish stripes across the back, alternately but not regularly longer, and becoming dilated on the vertebral line. Gill-covers metallic green and gold. Pupils purplish; irides silvery. A dark round spot at the base of the caudal. Dorsals dark brownish, resulting from numerous minute dark spots on their membranes. Caudal fin with four or five dark vertical bands.

Length, 2·0 – 4·0. Depth, 0·3 – 0·5.
Fin rays, D. 13.15; P. 15; V. 1.5; A. 12; C. 15 $\frac{3}{3}$.

I obtained this beautiful little fish at Westport on Lake Champlain, where it appeared to be very abundant. It is numerous also in many streams in that vicinity. It readily takes the hook, and is extremely active and voracious. Its popular name in that district is the *Little Pickerel*, or *Pickering*, which is also applied to many other species.

GENUS LUCIOPERCA. *Gesner, Cuvier.*

Ventrals beneath the pectorals, with five soft rays. Two dorsal fins. Canine or long teeth mixed with smaller ones.

This genus includes a few fresh-water fishes from the northeastern parts of Europe, from Asia and North America. Its name indicates the united characters of a perch and pike. In this State, we describe two species.

THE YELLOW PIKE-PERCH.

LUCIOPERCA AMERICANA.

PLATE L. FIG. 163. — (STATE COLLECTION.)

Perca vitrea, The Glass-eye. MITCHILL, Suppl. Am. Month. Mag. Vol. 2, p. 247.
Lucioperca americana, Le Sandre d'Amérique. CUV. et VAL. Hist. Poiss. Vol. 2, p. 122. pl. 16.
L. id., The American Sandre. RICHARDSON, F. B. A. Fishes, p. 10.
The Okow or *Horn-fish.* ID. Ib. p. 14.
L. lucioperca, Salmon of the Ohio, Pike of the Lake. KIRTLAND, Zool. Ohio, p. 190.

Characteristics. Greyish tinged with yellow. A black mark on the posterior part of the spinous dorsal. Lower edge of the opercle smooth. Length, 12 to 18 inches.

Description. Body elongated, cylindrical, tapering; profile of the head in a gently sloping straight line to the extremity of the snout. Scales moderate, subquadrate, ciliate on the rounded free margin, with six radiating plaits in front. Lateral line nearly straight from the upper edge of the gill-cover to the tail, including in its course ninety-five scales. Orbits large, oval, 0.7 in their antero-posterior diameters. Nostrils double; the anterior with a valvular orifice. Preopercle serrated by a series of distant spines, directed upwards on the posterior margin, and forward, beneath. Opercle with a slender flat terminal spine, beyond which is a pointed membrane. Branchial rays seven. Mouth wide, extensible; the lower jaw received into the upper. A series of acute recurved teeth in both jaws, and on the vomer and palatines. Two very long and conspicuous teeth, resembling canines, in front of each jaw; those of the lower received into cavities above. Teeth on the vomer minute; the anterior on each palatine very large and conspicuous. Tongue smooth, pointed, free.

The first dorsal fin arises at a point vertical to a line between the bases of the pectoral and ventral fins, and is composed of thirteen long and slender spinous rays: some authors have enumerated fourteen. The first rays are an inch long; the second, nearly a third longer; thence subequal to the eighth, when they rapidly subside to the last, which is attached to the body by a broad black membrane. The second dorsal fin with one short simple subspinous ray, and twenty-one articulated rays: it arises half an inch behind the first dorsal; its anterior soft rays longest, thence gradually diminishing, and ending half an inch posterior to the termination of the anal fin. Pectorals somewhat pointed, 1·8 long, and composed of fourteen rays, the tip reaching beneath the eighth ray of the spinous dorsal fin. Ventral fins placed slightly behind the pectorals, and composed of one stout spine of five branched rays; its tips reach a point equidistant between its base and the vent. Caudal fin furcate, with numerous accessory rays.

Color. Yellowish olive above the lateral line; lighter on the sides; silvery beneath. Head and gill-covers mottled with green, brownish and white. Chin pale flesh-color. Pupil dark and vitreous; irides mottled with black and yellowish. Membrane of the spinous dorsal transparent, with a few dark dashes; the upper part of the membrane tipped with black; posterior portion of the membrane, including the two last rays, black. The soft dorsal fin light yellowish, spotted with brown in such a manner as to form irregular longitudinal dusky bars. Pectoral fins yellowish olive, with maculated brownish bars. Ventral fins transparent yellowish. Anal fin of the same color, with a broad whitish margin. Caudal fin with irregular dusky bars.

Total length, 14·5. Greatest depth, 2·2.
Length from the snout to the point of the opercle, 3·5.
Fins, D. 13.1.21; P. 15; V. 1.5; A. 1.14; C. 17$\frac{8}{8}$.

This is the *Common Pike*, *Pickerel*, *Pickering*, *Glass-eye* and *Yellow Pike* of the Great Lakes, and of most of the streams and inland lakes in the western parts of the State. In Ohio it has received the name of *Salmon*. The ordinary common names give no correct idea of its character. It is a true Perch, although its form and habits suggest very naturally the idea of a Pike. I have therefore applied to it a name which indicates its true position, and is a translation of its classical appellation.

The Pike-perch is exceedingly voracious, and is highly prized as food. It is caught readily with the hook, and appears to prefer as bait the common fresh-water cray-fish (*Astacus bartoni*). The best time for fishing is in the dusk of the evening, with a great length of line out, and keeping it gently in motion. The foot of rapids, or beneath mill-dams, appears to be its favorite haunts. In the heat of summer, it seeks the deepest parts of lakes, or in streams in the coolest parts concealed under weeds or grass. According to Dr. Kirtland, it is one of the most valuable fishes for the table, found in the western waters, and sells readily at a high price. It is found in such quantities about the Maumee river, as to induce fishermen to take it as an article of commerce. At Lake Huron, it spawns in April or May. It is occasionally much larger than the dimensions of the one described above. In Chautauque

lake, I was informed of one which was thirty inches long. It had swallowed a duck, which had thrust its head through the gill openings of the fish, and having thus destroyed it, both were found dead on the shore.

The Pike-perch is found from the Ohio, through all the great lakes, and through the rivers of the fur countries up to the fifty-eighth parallel of latitude. Fishermen enumerate in our State three species or kinds: The *Blue Pike*, which I have seen, and consider as an aged individual of the present species; the *Yellow Pike*, just described; and the *Grey Pike*, which I consider as specifically distinct. Under the name of *Perca vitrea*, Mitchill has described a species which may apply to this or the following, but the description is too vague to enable me to adopt his previous name.

THE GRAY PIKE-PERCH.

LUCIOPERCA GRISEA.

(STATE COLLECTION.)

Characteristics. General hue greyish. Membrane of the spinous dorsal fin without the black spot. Invariably smaller than the preceding. Length ten to twelve inches.

Description. Form of the head, body and opercles resembling entirely the preceding. The first dorsal with fourteen, and the second with eighteen rays. Anal with thirteen rays.

Color. Color yellowish, strongly tinged with grey. Opercular bones, and summit of the head greyish. The first dorsal fin light-colored, tinged with yellowish, and with a rounded or irregular blue-black spot on the membrane between each ray. The second dorsal of the same color, with a series of similar spots forming two or more irregular bars. Pectoral fins yellowish, with a few dark spots. Ventrals yellowish, immaculate. Anal whitish, transparent. Caudal fin with alternate transverse bars of bluish brown and faint yellowish.

Length, 10·0 – 12·0.
Fins, D. 14.1.17; P. 15; V. 1.5; A. 13; C. 17 $\frac{8}{8}$.

This species is found with the preceding, but is never larger than as given above. It is equally prized as an article of food.

(*EXTRA-LIMITAL.*)

L. canadensis. (Griffith's Cuv. Vol. 10, pl. 1, p. 275. Pl. 68, fig. 221.) Dark olive green above; beneath whitish; a few pale yellow spots on the sides below the lateral line. Lower margin of the opercle with five acute spines. Length 14 inches. *River St. Lawrence.*

GENUS BOLEOSOMA.*

Two dorsal fins. Opercle scaly, with a single spine. Preopercle smooth on the margin. Six branchial rays. Nape depressed, contracted.

THE TESSELLATED DARTER.

BOLEOSOMA TESSELLATUM.

PLATE XX. FIG. 57. — (STATE COLLECTION.)

Characteristics. Small, brownish, with oblong quadrate spots on its back and sides. Length two to three inches.

Description. Body cylindrical, tapering, covered with rough scales, which extend over the opercular bones. Scales moderately large for the size of the fish, rounded; truncated and plaited in front, ciliate on the free margin. Lateral line tubular, broadly and regularly concave, nearly medial. Head small. Nape smooth, and depressed at the basal line as if strangulated; thence ascending to the interorbital space, and descending rapidly to the tip of the snout. Eyes large, contiguous, 0·12 in diameter, and less than their diameters apart; the space between deeply furrowed. Nostrils double; the posterior near the edge of the orbit, the anterior with valvular margins. Opercle with a pointed membrane behind; and in advance of this, a small but robust spine. The preopercle with a smooth margin, and rounded at its angle. Branchial membrane with six rays. Mouth small, terminal, slightly protractile. Very minute card-like teeth in the jaws, forming two or more series. Equally minute teeth on the vomer, and anterior portion of the palatines. Tongue smooth. No swim-bladder.

Dorsal fins two; the first commencing on the anterior third of the head and body; the first dorsal with nine spinous rays; the first ray slightly shorter than the second; the third, fourth and fifth, subequal, longest; thence gradually diminishing to the last, which is supine, and nearly hidden in the depression which contains the fin. The second dorsal fin arises 0·2 behind this last, and contains fourteen branched rays longer than high; highest in front, where it exceeds in height the spinous dorsal, and gradually diminishing behind, ending beyond the termination of the anal. Pectorals pointed, hastate, the tip reaching the end of the first dorsal; composed of thirteen rays, the fifth and sixth longest, the inferior ray shortest. Ventrals small, arising posterior to the base of the pectorals; composed of one simple and five branched rays, of which the third is longest. Anal nearly as long as high, composed of ten rays, of which the first two are short. Vent under the origin of the second dorsal fin. Caudal fin even, and is a powerful instrument, 0·45 in length.

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* From βολις, a *dart* or *javelin*, and σωμα, *body*.

Color. Olive brown, with from five to seven oblong quadrate black spots on the back along each side of the dorsal fin. Another series of spots, similar in shape, size and color, along the lateral line, and varying in number from seven to nine on each side. A short vertical black line from the eye, directed obliquely forward, and a similar black dash extending from the eye to the nose. Fins transparent; the rays spotted with light brownish, forming narrow bars. Pupil black; irides brown.

Length, 2·5. Depth, 0·4.
Fin rays, D. 9.14; P. 13; V. 1.5; A. 10; C. 17 $\frac{5}{5}$.

This singular and beautiful little fish does not appear to have been hitherto described. It is usually seen at the bottom of clear springs or streams, lying for a while perfectly still near the bottom, and then suddenly darts off with great velocity at its prey. This habit has acquired for it the popular name of *Darter*. Another name, *Grand-oranchee*, is given to it in this State by the descendants of the Dutch colonists, but of its meaning I have obtained no satisfactory explanation. It occurs in most of the fresh-water streams of the State.

I find among the *Percidæ*, no genus with which this can be satisfactorily arranged, nor indeed is there any combining the characters of two dorsals with six branchial rays. *Etheostoma*, a loosely constructed genus, which is cited by Kirtland (Boston Journal, Vol. 3, p. 347), approaches it in the form of its head, but its opercles are said not to be scaly.

GENUS SERRANUS. *Cuvier.*

With a single dorsal. Canine teeth mingled with others. Preopercle minutely denticulate. Opercle with one or two spines; generally with scales on the jaws.

Obs. This genus, established by Cuvier, embraces at present about one hundred and ten marine species. The preopercle, in many species, becomes so minutely denticulate as to appear entirely smooth. The jaws also present remarkable varieties; some species having them covered with large scales, whilst in others they are scarcely visible. This and all the succeeding genera of the family Percidæ have a single dorsal fin.

THE GROPER.

SERRANUS ERYTHROGASTER.

PLATE XIX. FIG. 52.

Characteristics. Olive brown above; beneath red. Dorsal and caudal, ventral and anal fins bordered with blue, and edged with dusky. Length two feet.

Description. Body oblong, subcompressed, deepest at the origin of the dorsal fin, thence tapering gradually to the tail. Height, to its length, as one to three and a half. Body covered with small quadrate oblong rough scales, ciliated on the margin with about eight

radiating plates on the anterior surface. The scales cover the opercular bones, and the lower jaw, where they are small, long, narrow and elliptical, and are also on the bases of the fins. Lateral line concurrent with the dorsal outline. Head large; its outline sloping in a regular but slight curve to the snout, and, measured to the point of the opercle, is one-third of the total length. Eyes large, near the facial outline, and 1·0 in diameter. Nostrils double, contiguous, subequal; the anterior with a valvular membrane on its posterior margin. Preopercle denticulated minutely on the upper part of the ascending branch, more strongly towards the angle, which is rounded, and, with the lower margin, smooth. Opercle terminating in a flat membranous point: on its surface, 0·5 in advance of its tip, is a flat lancet-shaped spine; beneath this, and slightly in advance, is a second spine of the same size and shape; and near the upper angle of the branchial aperture is a third, more obscure, and rounded. Mouth large, protractile, extending back beneath the orbits. Lips fleshy. Teeth small, acute, conic, recurved, distributed in two bands in the jaws, with an intervening free space in the centre; the teeth in the posterior series are larger as they approach the centre of the jaw; the exterior series is composed of longer, very acute, more robust, and distant teeth. Vomer, palatines, pharyngeals, and branchial arcs covered with acute bristly teeth.

The dorsal fin commences eight inches from the end of the snout, or above the point of the opercle, and contains eleven robust spinous rays received into a furrow, and sixteen flexible rays: the first spinous ray short, less than half the length of the second; the third longest; the tenth shorter than the eleventh. The soft portion of the dorsal rounded, equalling in height the longest spinous rays; it terminates beyond the end of the anal. Pectorals placed low down, rounded, with one simple and fifteen branched rays, with a scaly fold on the superior part of its base behind. Ventrals placed slightly behind the base of the pectorals, pointed, triangular, with one robust spine and five branched rays; the posterior ray attached to the abdomen by a membrane. Vent about an inch in front of the anal fin, which has two spines and ten soft rays: the first short, robust, acute; the third simple, scarcely spinous, and enveloped in membrane; the remainder branched. This fin commences under the second ray of the soft portion of the dorsal, and is high and rounded, equalling in height the longest spinous rays of the dorsal. Caudal broad, crescent-shaped, and composed of sixteen rays.

Color. Brownish olive, with a reddish tinge. Jaws, chin, branchial membrane, abdomen, pectoral and ventral fins, and base of the anal fin, of a beautiful salmon-red, more or less brilliant. Interior of the mouth of a bright blood-red. Dorsal, anal and caudal fins brownish-black, with a bluish submargin bordered with black more or less deep: this black color is more intense on the caudal fin. Pupils black; irides yellow. This is the general distribution of the colors in the particular individual described above; but in thirty or forty others which I have examined, the general color is brownish, slightly tinged with red, the abdomen exhibiting most of the latter color.

Length, 24·0. Greatest depth, 7·0.
Fins, D. 11.16; P. 16; V. 1.5; A. 2.10; C. 16.

This beautiful fish, which is not unusual in our markets in June and July, where it sells from six to twelve cents per pound, is called by the fishermen, *Groper* and *Red Groper*. It is a southern species, and is brought hither from the reefs of Florida; but I have been assured by intelligent fishermen, that it is occasionally, but very rarely, taken off our coast. Dr. Holbrook informs me that it is brought into the Charleston market from Florida, in the months of January, February and March. It bears a general resemblance to *Hemulon;* but all its characters combine to place it in this family, and under *Serranus*, or rather to that subdivision (*Merou*) which has not yet received a distinct appellation, but which is characterized by the lower jaws being covered with fine scales. Its flesh is rather tough, and held in little estimation.

(*EXTRA-LIMITAL.*)

S. morio. (Cuv. and Val. Vol. 2, p. 285.) Brownish above, reddish beneath; maxillaries and branchial membrane red; pectorals orange; ventral spotted with red; anal with three spines. Length two and a half feet. *Antilles.*

Obs. This appears closely allied to the preceding. Cuvier states that he has received it from New-York, through Mr. Milbert.

S. acutirostris. (Id. Vol. 2, p. 286.) Entirely brown. Snout more elongated than in the other species. Preopercle very minutely denticulated. Length two feet. *Charleston.*

Obs. In the collection of drawings of the fishes of Carolina, obligingly communicated by Dr. Holbrook, are two species similar to the above, but apparently undescribed.

S. fasciculatis. (Id. Vol. 2, p. 245.) With 5 – 6 longitudinal bands. Preopercle with two groups of radiating spines on the lower part of its posterior margin. Three transverse lines on the summit of the head. Length 6 – 10 inches. *Charleston, S. C.*

GENUS CENTROPRISTES. *Cuvier.*

A single dorsal fin. All the teeth on the jaws, vomer and palatines, velvet-like. Preopercle serrated. Opercle spinous. The snout, jaw and branchial membrane without scales.

THE BLACK SEA BASS.

CENTROPRISTES NIGRICANS.

PLATE II. FIG. 5. — (STATE COLLECTION.)

Perca, Black-fish in New-York. SCHŒPFF, Beobacht. Naturf. Fr. Vol. 8, p. 164.
Coryphæna nigrescens. BLOCH, Syst. posth. p. 297.
Lutianus trilobus. LACEPEDE, Hist. Poiss. Vol. 4, p. 246, pl. 16, fig. 3.
Perca varia. MITCHILL, Report in part, etc. p. 10.
P. id., Sea Basse. ID. Lit. and Phil. Soc. N. Y. Vol. 1, p. 415, pl. 3, fig. 6.
Le Centropriste noir, Centropristes nigricans. CUV. et VAL. Hist. Poiss. Vol. 3, p. 37, pl. 44.
C. id., The Black Perch. STORER, Fishes of Massachusetts, p. 9.

Characteristics. Uniform bluish-black. Dorsal fin mottled with white. Caudal fin, when perfect, trilobate. Length, 6 – 12 inches.

Description. Body oblong, compressed, somewhat carinated on the back before the dorsal fin. Scales subquadrate, ciliate, with radiating plaits on the radical surface, and festooned on the anterior margin; they extend over the opercle, suborbitals, and high up on the caudal fin; eighteen are counted vertically, and fifty-four along the lateral line: this line is concurrent with the dorsal outline. Preopercle distinctly denticulated on its whole margin. Opercle with a sharp spine, and above it another, which in young individuals is almost effaced. Eyes large, and near the frontal outline. The nostrils are double, in the same plane with the upper border of the orbits, and nearer to the orbits than to the snout; the posterior largest, oval; the anterior with a valve. Teeth velvet-like throughout; several series on the jaw, of which the outer row is largest. Tongue pointed, smooth, free.

The dorsal fin commences above the base of the pectorals, and ends beyond the termination of the anal. The spinous rays have each of them a membranous slip attached to their tips; this portion of the fin is lower than the branched rays, which form an elevated and rounded fin. The first two spinous rays are short; the third longest. A series of scales rise up on the membrane between the rays of this fin, for nearly one-fifth of its height; and the same occurs on the anal and caudal fins. The pectorals broad, and reaching to the vent. Ventrals rounded. Anal fin with three spines and seven branched rays, which latter are high and obtusely rounded. The caudal fin, although usually described as rounded, is in fact trilobed; but the rays of the tips are so exceedingly delicate, that they usually present a ragged appearance difficult to describe. I searched among many individuals, before I could find one as complete as the imperfect one figured above. In the youngest and smallest specimens, this imperfection is quite as manifest as in others. When perfect, the tips end in a delicate elongated point, and the middle of the fin is rounded.

The stomach of the Black Sea Bass has four cæcal appendages. The generative organs are double, both in the male and female. The air-bladder is large and simple. There are twenty-four vertebræ.

Color. A uniform bluish-black, sometimes with a bronzed appearance. Dr. Mitchill describes this species as "regularly speckled with black and white from the head to the tail." The deeper color of the edges of the scales gives a regularly reticulated appearance to the whole surface of the body. The fins, excepting the pectoral, are of a light blue color. The dorsal fin distinctly, and the anal fin more faintly, mottled with pale blue.

Length, 6·0 – 12·0.
Fin rays, D. 10.11; P. 18; V. 1.5; A. 3.7; C. 17 $\frac{3}{2}$.

This is one of the most savory and delicate of the fishes which appear in our markets from May to July. Its most usual name with us is *Sea Bass*, although it is sometimes called *Blue-fish*, *Black Harry*, *Hannahills* and *Black Bass*. Farther south, it is named *Black-fish*. Its geographical range appears to be extensive along our coast. It is found on the coast of Florida, and its northern limits appear to be bounded by Cape Cod on the coast of Massachusetts. We learn from Dr. Storer, that it is caught in great numbers at Martha's Vineyard, for the New-York market. It is a southern species, ranging northward in the early part of the summer, and returning in the autumn. From causes which we are unable to explain, it sometimes happens that its northern migration is obstructed to a considerable extent.

(*EXTRA-LIMITAL.*)

C. trifurca. (Cuv. et Val., Vol. 3, p. 43.) With seven blue bands. The third and fourth dorsal spines with fleshy slips, as long as the spines themselves. *S. Carolina.*

GENUS GRYSTES. *Cuvier.*

Opercle spinous. Preopercle entire. A single dorsal. All the teeth uniform, velvet-like.

THE GROWLER.

GRYSTES SALMOIDES.

PLATE LXIX. FIG. 223.

White Salmon. SMITH, Hist. Virginia.
Labre salmoïde. LACEP. Vol. 4, p. 716, pl. 5, fig. 2.
Cichla variabilis. LESUEUR, Acad. Sc. as cited by Cuvier.
Grystes salmoides, Le growler salmoïde. CUV. et VAL. Vol. 3, p. 54, pl. 45.

Characteristics. Deep greenish brown, with a bluish spot on the point of the opercle. *Young*, with numerous longitudinal lines. Length 6 – 24 inches.

Description. Greatest depth, to its length, as one to four nearly; its thickness not quite half of its depth. Profile not very declivous. Lower jaw longest, with four or five pores under each of its branches. Minute teeth in broad bands. Opercle terminates in two moderate points, of which the uppermost is short. Branchial rays six, and occasionally seven; a notable variation, but which is positively established. Humeral bone smooth. Scales ciliate, moderate; ninety in a longitudinal series, and thirty-six to forty in a vertical line. Scales only on the opercular bones and cheeks; small ones on the soft portions of the dorsal, anal and caudal fins. Lateral line concurrent with the back. Dorsal fin commences about the middle of the pectorals; the fourth ray highest. Pectoral and ventral fins small. Caudal fin slightly crescent-shaped.

Color, in the adult, deep greenish-brown, with a bluish-black spot on the point of the opercle. *Young*, with from twenty-five to thirty brownish longitudinal bands, which appear to become effaced with age.

Length, 6·0 — 24·0.
Fin rays, D. 10.13 or 14; P. 16; V. 1.5; A. 3.11 or 12; C. 17.

The above description, from Cuvier, would seem to imply the existence of two species. He received them from New-York, from Carolina, and from the Wabash (Indiana). Those from New-York varied from six to nine inches, and had six branchial and fourteen soft dorsal rays. The Wabash specimens varied from five to sixteen inches in length. In Carolina, it attains a length of two feet, is considered as excellent food, and passes under the name of *Trout*. I have seen neither the species nor the description of *C. variabilis*, cited by Cuvier.

GENUS CENTRARCHUS. *Cuvier.*

Preopercle not denticulated. Velvet-like teeth in the jaws, front of the vomer, on the palatines, and base of the tongue. Angle of the opercle divided into two flat points. Anal spines usually numerous. Body oval, compressed. A single dorsal.

Obs. This is a numerous group in the United States.

FRESH-WATER BASS.

CENTRARCHUS ÆNEUS.

PLATE II. FIG. 4.—(STATE COLLECTION.)

Cichla ænea. Lesueur, Journ. Acad. Nat. Sc. Vol. 2, p. 214, pl. 12.
Centrarcus æneus. Cuv. et Val. Hist. des Poiss. Vol. 3, p. 84.
Cichla ænea, Rock Bass. Kirtland, Zool. Ohio, p. 168 and 190.

Characteristics. Dark greenish bronze, with 5 – 6 series of irregular subquadrate spots on the sides below the lateral line. Anal fin with six spinous rays. Length 6 – 10 inches.

Description. Body short, compressed; its height rather exceeding the length of the head measured to the posterior angle of the opercle. Head scaleless between and anterior to the eyes. Scales small on the preopercle, larger on the opercle; slight indications of serratures about the angle of the preopercle. Scales adherent; on the sides, large and rounded, and, under the lens, denticulated on their free margins, truncated and plicated at their bases. Thirteen rows of scales below the lateral line, and about six above; they ascend upon the bases of the dorsal, anal and caudal fins, forming a sort of sheath as in the family Scienidæ. Lateral line concurrent with the back, and composed of a series of single tubes; in some individuals, I have noticed this line to be distorted in a very anomalous manner. Eyes very large, and rather prominent. Nostrils small and double. Opercle with the rudiments of a double angle on the posterior margin. Lower jaw somewhat longest. Teeth small, subequal, conical, recurved; on the jaws, vomer, palatines and pharyngeals. Stomach with from five to seven short cæcal appendages, and filled with the young of a species of *Astacus* or crayfish.

Dorsal fin long, commencing above the ventrals, and composed of eleven spinous and twelve articulated rays: the first, second and third rays of the spinous portion successively longer; the remainder subequal, and all acutely spinous: the articulated portion rounded, with longer rays; the sixth, seventh and eighth exceeding the others in height. The pectorals broad and rounded, composed of fourteen rays. Ventral fins placed just behind the pectorals, and composed of one weak spine and five multifid rays, the last connected to the body by a broad transparent membrane. Anal fin compound; arising under the eighth spinous ray of the dorsal fin, and comprising six spinous and eleven articulated rays; the first spinous ray very short, the

articulated portion oblong and rounded. Caudal fin emarginate, with the tips rounded. The scales on the base of this fin ascend high up on the membrane.

Color. The general appearance of this fish is a dark greenish bronze. Head above dark bottle-green. Back, above the lateral line, of the same color. Gill-covers metallic green. A dark spot above the posterior angle of the opercle. The sides below the lateral line with six or more longitudinal series of subquadrate dark spots. Pupils dark purple, with a narrow golden ring; the remainder of the eye blue and reddish. Dorsal fin light green, with lighter spots on the rays. Membrane of the caudal fin darker than the rays. Ventral and anal fins tipped with bright blue. Pectorals light olive-green.

Length, 6·0 – 8·0. Depth, 2·0 – 3·0.
Fin rays, D. 11.12; P. 14; V. 1.5; A. 6.11; C. 17 $\frac{3}{3}$.

This description was drawn up from several specimens which I obtained in Lake Champlain, where it is called *Rock Bass*. It is an edible species, and readily takes the hook. This species occurs abundantly in the great lakes, and in the larger streams in the western counties of the State. Since the completion of the Erie and Champlain canals, it has made its appearance in the Hudson river. The *C. æneus* of Richardson, which was recognized by Cuvier, exhibits some difference, particularly in the serratures of the lower margin of the preopercle, which almost incline us to the belief that our species is undescribed. It is possible, however, that these may be variations depending on age or locality. If it be *C. æneus*, the characters of the genus will require to be changed.

THE BLACK FRESH-WATER BASS.

CENTRARCHUS FASCIATUS.

PLATE III. FIG. 8.

Cichla fasciata. LESUEUR, Jour. Acad. Sc. Vol. 2, p. 216.
C. ohioensis. ID. Ib. p. 218.
C. minima. ID. (Young?)
The Black Bass of the Lake and of the Ohio. KIRTLAND, Zool. Ohio, p. 191.

Characteristics. Large. Anal fin with three spines. Color dusky bluish; often with transverse bands. Length, 12 – 15 inches.

Description. Body compressed. Back arched, gibbous. Profile descending obliquely to the rostrum, which is moderately prolonged. Scales large, truncate, and with radiating plaits at the radical portion; the free portion small, rounded, concentrically striate, minutely denticulate on the margin. Scales on the opercle large, with a single series on the subopercle; much smaller on the preopercle, and ascend high up on the membrane of the soft dorsal and caudal fins. The intra-orbital region, and the jaws, scaleless. Lateral line concurrent with the back. Eyes moderate. Nostrils double, vertical, contiguous; the anterior on its posterior border, with a membranous valve; near these, a few open pores. Opercles

pointed with a loose membrane. Lower jaw somewhat advanced, with a single series of from eight to ten distant pores beneath. Both jaws armed with a broad patch of minute, conic, acute, recurved teeth. An oblong patch of rasp-like teeth on the vomer, and a long band of similar teeth on the palatines. A transverse membrane in the anterior part of both jaws. A small patch of minute teeth on the centre of the tongue, which is free, and thin on the margins. Branchial arches minutely toothed on the upper surface near the tongue, with long, serrate, spinous processes above. Pharyngeal teeth in rounded patches. Branchial rays six.

Dorsal fin commences slightly behind the pectorals. The anterior portion consists of nine stout spines, received into a sheath below; the first is shorter than the second, which again is not so long as the third, and this latter is subequal with the remainder. A small and not very evident depression separates it from the other portion, which consists of one spinous and fourteen branched rays: it terminates above the end of the anal. This portion of the dorsal fin is high, and somewhat rounded; the second simply articulated, not branched, and the three posterior rays successively shorter. The pectorals under the posterior angle of the opercle, broad, and obtusely pointed. It contains eighteen rays, of which the fifth, sixth and seventh are longest. Ventral fins placed slightly behind the pectorals, and composed of five robust branched rays. Anal fin higher than long, commencing under the third soft ray of the dorsal, and composed of three spinous and twelve articulated rays, of which latter, the fourth, fifth, sixth and seventh are longest; the first spinous ray very short, the second slightly longer, and the third double the length of the preceding. Caudal fin emarginate; tips rounded, and composed of sixteen flat, robust, multifid, and six accessory rays on each side.

Length, 13·5. Of head, 4·0. Greatest depth, 4·2.
Fin rays, D. 9.1.14; P. 18; V. 5; A. 3.12; C. 16 $\frac{6}{6}$.

This species is common in the great lakes, and in the numerous smaller ones in this State, where it is generally known under the name of *Black Bass*. The species appears to differ very much in different localities, not only in color but in form; and according to Dr. Kirtland, the same individual will change its color repeatedly in a short space of time, if confined in a vessel of water. The specimen from which I had drawn up my description, was from Oneida lake; and until I had examined many others at Buffalo and Oswego, I supposed it to be specifically distinct from Lesueur's species. It is very probable, nevertheless, that there are several species yet to be detected, which pass under the general name of *Black Bass*.

THE OBSCURE FRESH-WATER BASS.

CENTRARCHUS OBSCURUS.

PLATE XVII. FIG. 48. — (CABINET OF THE LYCEUM.)

Characteristic. Body not gibbous.

Description. Body compressed, regularly arched above, not gibbous, highest along the spinous portion of the dorsal fin. Scales small, orbicular, concentrically striate on their free surfaces, covering the head and body, and rising very slightly on the base of the dorsal. Lateral line tubular above the upper margin of the opercle; makes a curve downwards over the point of the opercle, then rises a little anterior to the first spinous ray of the dorsal, and then becomes concurrent with the line of the back. Head moderately small, and somewhat pointed; sloping gradually to the nape, thence ascending more rapidly to the dorsal ray. Eyes very large. Nostrils double, distant, the posterior largest; a small mucous pore beneath the anterior nostril. Lower jaw longest. Numerous fine teeth in both jaws, very acute, and recurved; forming many rows in front, and fewer on the sides of the jaw. Still more minute teeth on the vomer and palatines. Opercular bones scaly; the opercle with a membranous margin, and terminating in a flat point, which is occasionally double.

The dorsal fin arises behind the base of the pectorals, composed of nine spinous and thirteen simple rays. The first spinous is shortest; the first of the soft portion simple; the remainder articulated, and much higher than the spinous portion: it is coterminal with the anal fin. Pectorals oblong, and composed of sixteen rays; the upper ray subspinous, simple. Ventral fin pointed, contiguous, composed of one spinous and five branched rays. Anal rounded, of three spinous and twelve branched rays; the first spine short, the others gradually longer. Caudal fin emarginate, of seventeen entire and three accessory rays on each side. All the rays of this fin are broad and compressed, with scales ascending high up towards their extremities.

Color. A general greenish-brown or dark-olive, with faint metallic bronze on the upper parts; beneath lighter.

Length, 6·0 – 8·0.
Fins, D. 9.1.12; P. 16; V, 1.5; A. 3.12; C. 17 $\frac{3}{3}$.

This species, which I do not find exactly described, was obtained from Onondaga creek, where it is called, with many others, *Black Bass*. The *Cichla minima* of Lesueur may possibly prove to be the young of this species.

(*EXTRA-LIMITAL.*)

C. pentacanthus. (CUV. et VAL. Vol. 3, p. 88.) Dorsal fin with ten, and anal with five spines. Five inches. *River Wabash.*

C. hexacanthus. (Id. Vol. 3, p. 88, and Vol. 7, p. 458.) Dorsal lowest in front; anal high and long. D. 8.16; P. 12; V. 1.5; A. 6.18. Length 12 inches. *Wabash river.*

C. sparvides. (Id. Vol. 7, p. 459.) Anal higher than in any other species of the genus. Fourteen series of black points along the sides. D. 12.13; A. 9.15. Length seven inches. *South-Carolina.*

C. irideus. (Id. Vol. 3. p. 89.) Fins spotted with brown; dorsal with a large round, black spot, bordered with yellow or orange. D. 11.14; A. 7.16. Length six inches. *South-Carolina.*

C. gulosus. (Id. Vol. 3, p. 498, and Vol. 7, p. 459.) Mouth exceedingly large. Brilliantly colored. D. 10.9; A. 3.8. Length eight inches. *South-Carolina, Mississippi.*

C. virides. (Id. Vol. 7, p. 460.) Green, with scattering black spots. Resembling *C. æneus* in form. D. 11.10; A. 3.8. Length eight inches. *Carolina.*

GENUS POMOTIS. *Cuvier.*

A few denticulations, more or less obvious, on the borders of the preopercle. Palatines and tongue smooth, and without teeth. Minute teeth on the jaws, vomer and pharyngeals. Branchial rays six. Opercle with an elongated membrane at its angle.

Obs. This is an exclusively American genus, and composed entirely of fresh-water fishes. It is very closely allied to the succeeding genus. The type of this genus was originally made a *Labrus* by Linneus, Lacepede and others; but in calling it a *Perch*, the common people, according to Cuvier, exercised more discernment than naturalists.

THE COMMON POND-FISH.

POMOTIS VULGARIS.

PLATE LI. FIG. 166.

Labras auritus. Lin.
Sparus, Goldfish. Schœpff, Loc. cit. Vol. 8, p. 150.
Morone maculata. Mitchill, Report in part.
Labrus auritus. Id. Tr. Lit. and Phil. Soc. N. Y. Vol. 1, p. 403.
Le Pomotis commun, P. vulgaris. Cuv. et Val. Hist. Poiss. Vol. 3, p. 90, pl. 49.
The Northern Pomotis, P. id. Richardson, Faun. Bor. Am. Fishes, p. 24, pl. 76.
Fresh-water Sun-fish, P. id. Storer, Fishes of Massachusetts, p. 11.

Characteristics. Green mixed with olive, and numerous dull reddish spots over the body. Appendix of the opercle black, bordered behind with scarlet. Length six to eight inches.

Description. Body much compressed, oval, deepest about the fourth dorsal spine. Forehead sloping to the mouth. Scales large, adherent, oval, even, and subdentate on the concealed margin. Lateral line concurrent with the back. Head small, one-sixth of the total length. Eyes large, circular, and near the facial outline. Nostrils double; the anterior tubular. Mouth small, protractile, with very minute crowded teeth on the jaws, vomer and

pharyngeals. Preopercle obsoletely crenated, visible under a lens. Opercle terminating in a bony obtuse point, which is still farther prolonged by an attached membrane. Dorsal fin compound; the spinous portion with subequal rays, except the first, which is somewhat shorter than the following; the soft portion high and rounded. Pectorals long, subtriangular, pointed, reaching to the soft portion of the dorsal. Caudal fin emarginate.

Color. Greenish-olive above, with irregular points of red, and broader yellow or reddish brown spots disposed in very irregular series. Ranges of brighter spots on the bluish opercles, radiating from the region of the mouth. On the posterior prolongation of the opercle is a black spot, terminating behind in bright scarlet.

In Indian lake, Lake Janet, and others in that vicinity, I noticed a remarkable variety of the *P. vulgaris*, about four inches long. The appendix was black, margined with light blue; sides beautifully punctate with blood red; abdomen bright yellow; opercles longitudinally striate with blue.

Length, 4·0 – 6·0. Depth, 2·0 – 3·0.
Fin rays, D. 10.12; P. 12; V. 1.5; A. 3.9; C. 17 $\frac{4}{4}$.

This beautiful little fish has derived one of its popular names, viz. *Sun-fish*, from the glittering colors it displays while basking in the sun. The numerous spots on its body has occasioned it to be called by the whimsical name of *Pumpkin-seed*, in some districts of the State. In Massachusetts, it is often called *Bream*. It is of no value as an article of food, but is often caught for amusement.

The Common Pond-fish has a wide geographic range, extending from Lake Huron throughout the eastern States. According to Dr. Kirtland, it occurs in the western waters. Along the Atlantic, it is found as far south as Carolina, and probably still farther south.

THE BLACK-EARED POND-FISH.

POMOTIS APPENDIX.

Labrus appendix. MITCHILL, Suppl. Mem. Am. Month. Mag. Vol. 2, p. 247.

Characteristics. Body sombre colored, beneath whitish. Appendix entirely black. Length five or six inches.

Description. Body more robust, thick and chubby than the preceding; and the prolongation of the opercle broader, and much longer. Mouth larger, with a wide gape. Pectoral fins broader, and more rounded. Branchial or gill membrane with five rays.

Color. Scales less variegated than in the preceding. Throat and belly pale and whitish. The prolongation of the opercle marked with black only.

Fins, D. 10.11; P. 13; V. 5; A. 3.10; C. 19.

The above characters would seem to announce a new species. I have never met with it, and have adopted the description of Mitchill. Its broad appendix distinguishes it from *P. solis*, mentioned beneath.

(*EXTRA-LIMITAL.*)

P. ravaneli. (Cuv. et Val. Vol. 7, p. 465.) Back much arched; denticulations very fine at the angle of the preopercle. D. 10.11; A. 3.9. Length eight inches. *South-Carolina.*

P. holbrooki. (Id. Ib. p. 466.) Very large black spots on the soft rays of the dorsal; preopercle very finely denticulated. A. 3.11. Length nine inches. *South-Carolina.*

P. incisor. (Id. Ib. p. 467.) A single black spot on the soft rays of the dorsal appendix; long. D. 10.10; A. 3.9. Length six inches. *New-Orleans.*

P. gibbosus. (Id. Ib. p. 467.) Longitudinal series of blackish spots along the back; membrane of the opercle wide and striate. D. 10.11; A. 3.11. Length eight inches. *Charleston.*

P. solis. (Id. Ib. p. 468.) With no spots or stripes on the body or fins; appendix very long and narrow. D. 10.11; A. 3.10. *New-Orleans and New-York.*

P. catesbei. (Id. Ib. p. 469.) Brown and oblique lines on its cheeks; blackish points on the dorsal and anal fins. Body elongated. D. 10.11; A. 3.9. Length four and a half inches. *Philadelphia.*

Genus Bryttus, *Cuvier.* A narrow band of velvet teeth on the outer edge of each palatine. The form and all the other characters of the preceding.

Obs. Cuvier, to whom we are indebted for this genus, observes that it is impossible to find a greater resemblance than between this and *Pomotis*, the above character being the only one by which they can be contradistinguished. The three species following may prove to be simple varieties.

B. punctatus. (Cuv. et Val. Vol. 7, p. 462) Black points on its cheeks and the sides of the abdomen; first soft ventral ray filiform; appendix narrow, and not much elongated. D. 10.11; A. 3.8. Length five and a half inches. *South-Carolina.*

B. reticulatus. (Id. Ib. p. 463.) Bright yellowish-green; base of each scale darker, so that the body appears as if covered with a net work. D. 10.11; A. 3.11. Length seven inches. *South-Carolina.*

B. unicolor. (Id. Ib. p. 464.) Only three or four teeth on the anterior part of the palatines. Fins unspotted. Color uniform. D. 10.11; A. 3.9. Length six inches. *Pennsylvania, South-Carolina.*

GENUS DULES. *Cuvier.*

Six branchial rays. No canine teeth. Preopercle denticulated. Opercle with two or more flat spines.

Obs. This genus is allied closely in its forms and other characters to *Centropristes*, but is separated by the number of its branchial rays. Its species inhabit the seas of the torrid zone, but occasionally wander along our coast.

THE COACHMAN.

DULES AURIGA.

PLATE XIX. FIG. 54 — (CABINET OF THE LYCEUM.)

Le Doules cocher, Dules auriga. Cuv. et Val. Hist. Poiss. Vol. 3, p. 112, pl. 51.

Characteristics. Third ray of the dorsal fin elongated into a filament. Length four and a half inches.

Description. Body compressed, arched; height less than one-third of its length. Scales large, rounded, concentrically striate. Lateral line distinct, concurrent with the back. Summit of the head scaleless. Eyes large, less than one-third of their diameter apart, with two slight furrows between. Preopercle with the denticulations fine, and crowded on the ascending margin; large and more distant beneath. Opercle with two flat pointed spines, not extending beyond the margin; a rounded denticulated process above them. Lower jaw long. Fine velvet teeth on the jaws, vomer and palatines; on the upper jaw, in front, they are somewhat larger, but equal, and according to Cuvier, cannot be considered as canines. Dorsal fin undivided; commences over the branchial aperture; the first two spinous rays short; the third a long slender filament, as long as the interval between the base of the pectoral and caudal fins; the spinous portion of this fin equalling in length, but not as high as the soft portion. Pectorals broad and long. Ventrals beneath them. Anal fin with its second spinous ray longer than the first and third. Caudal fin nearly even, rounded.

Color. Yellowish-grey, with three or more dusky vertical bands. Ventral fins tinged with blackish towards their tips.

Length, 4·5.

Fin rays, D. 10.13; P. 17; V. 1.5; A. 3.7; C. 17 $\frac{2}{2}$.

This species can only be regarded in the light of an accidental visitor. I observed it several years ago in the collection of Mr. Hamilton, who informed me it had been taken in the harbor of New-York. From notes made at the time, it appears that I regarded it as a new species, under the name of *Serranus signifer*. Upon comparison, however, with a specimen in the Cabinet of the Lyceum from the island of Jamaica, I am satisfied that it is identical with the species described by Cuvier. It is a tropical species.

GENUS APHREDODERUS. *Lesueur.*

Six branchial rays. Teeth velvet-like. Denticulations on the two edges of the suborbital. Preopercle denticulated. Opercle with a spine at its angle. Ventral fins without a spinous ray. Vent under the throat.

Obs. This genus is founded on a species first observed in the neighborhood of Philadelphia, and referred, after a very slight examination, to *Scolopsides* of Cuvier, a genus of the family Scienidæ. The presence of teeth on the palatines excludes it, however, from this family. Subsequently Lesueur again saw it at New-Orleans, and elaborated its characters under a new genus Aphredoderus of the family Percidæ. This genus is in fact one of the most singular of the whole family, by the position of its vent, and the absence of a spine to the ventral fin. But one species has yet been detected.

THE SPINELESS PERCH.

APHREDODERUS SAYANUS.

PLATE XXI. FIG. 62.

Scolopsis sayanus. Gilliams, Jour. Acad. Nat. Sc. Vol. 4, p. 81, pl. 3.
Aphredoderus gibbosus. Cuv. et Val. Hist. Poiss. Vol. 9, p. 448, pl. 278.

Characteristics. Dusky; beneath light yellowish. Gibbous. Length three to five inches.

Description. Body oblong, thick, subcompressed. Back elevated, descending with an equal curve from the soft rays of the dorsal to the nape. Depth to total length as one to four nearly. Scales small, rough, rounded and ciliated; forty-five to fifty are counted in a longitudinal series. The lateral line very slightly curved, nearly straight, and passing near the middle of the body. Head flattened above. The anterior portion of the suborbital has a bony crest, supporting two or three spines, which are continuous with the denticulated crest of the upper margin, so that the lower margin of the orbit is smooth, while the upper two-thirds of the margin is rough; two crests form a longitudinal furrow between them. Preopercle wide, finely denticulated, with its angle rounded, and covered with six rows of scales. Opercles large, scaly, with a smooth margin, but a short robust spine near its angle. Eyes moderately large. Nostrils double; that near the margin of the orbit large, with an anterior valvular membrane; the anterior somewhat smaller, tubular. Lower jaw longest. Numerous conic incurved teeth on the jaws, anterior part of the vomer, palatines and pharyngeals. Tongue smooth; its end rounded and free. Branchial rays six. At the angle formed by the fold of the branchial membrane, is placed the vent.

Dorsal fin high, commencing an inch and a half from the end of the snout, and placed in the middle third of its body; it has three, and according to Gilliams four, spinous rays; the branched rays higher than the others, nearly subequal, the last somewhat shorter. Ventrals

slightly behind the base of the pectorals, and containing no spinous ray. Anal fin commences just before the termination of the dorsal, and has three short spinous rays. Caudal rounded, nearly even. Stomach very small. Intestine traverses the long abdominal cavity with three turns, and ends in the vent, under the throat. Six cæcal appendages. Urinary bladder small, oblong. Kidneys long and narrow, communicating directly with the bladder. Air-bladder very large, rounded at the ends, simple.

Length, 3·0–4·5.
Radial formula, Br. 6; D. 3.11; P. 12; V. 0.7; A. 3.7; C. 17.

This curious little species is also exceedingly rare, but four specimens having been obtained. Although I have not met with it in this State, yet its already ascertained wide geographic range leaves no doubt but that it will be detected here. In the *Histoire des Poissons*, the two individuals described are arranged without hesitation as belonging to the same species; and Lesueur, who drew them both, assigns a new name, forgetting in this instance the absolute rule of priority. The very doubtful propriety of naming species after individuals, leads me to regret that I must restore the original name. It is worthy of remark, that Lesueur, who drew and engraved the first specimen described by Gilliams, neglected noticing the very peculiar position of the vent; a circumstance equally unobserved by its describer. By a typographical error in this latter description, twenty-seven rays are attributed to the anal fin.

Little is known of its habits. It appears to prefer muddy pools, shaded by trees. At New-Orleans, it is called by the creoles *Tétard de Saint Domingue*.

GENUS URANOSCOPUS. *Linneus, Cuvier.*

Head large, cubical, flattened above. Branchial rays six. Velvet teeth on the jaws, vomer and palatines. A spine on the humeral bone. Eyes vertical. Ventrals jugular, or placed in advance of the pectorals, which are large. Lateral line ascends, and runs near the base of the dorsal fin.

Obs. In addition to these characters, many species have a long fleshy filament within the mouth in front of the tongue, which they are apparently enabled to thrust forth at their pleasure, and use as a bait for other fishes. The fishes of this genus, from their large and roughened head, and the size of their suborbitals, were for a long time arranged with *Cottus*, *Scorpæna*, and other genera of the family Triglidæ. Cuvier, however, discovered that the suborbitals are not, as in that family, articulated with the ascending branch of the preopercle, but with a bony plate above, which forms a part of the tympanic bone. The genus is susceptible of subdivision into two sections, according as they have one or two dorsal fins.

For a long time, it was supposed that the American shores of the Atlantic did not furnish a single specimen of this genus. Major Le Conte has, however, detected a beautiful little species on the coast of South-Carolina.

THE UNARMED URANOSCOPE.

URANOSCOPUS ANOPLOS.

PLATE XXII. FIG. 65. — (STATE COLLECTION.)

L'Uranoscope anoplose, U. anoplos. Cuv. et Val. Hist. Poiss. Vol. 8, p. 493.

Characteristics. Cheeks smooth and unarmed, no projecting filament from within the mouth. Length two inches.

Description. Form typical. Head flattened. Body entirely without scales. Lateral line distinct, ascending to the first dorsal, and running close along the base of the dorsals throughout their whole length, when it rapidly descends to the middle of the tail. The suborbital forms a long and slender process, which descends obliquely downwards and backwards; its posterior portion very narrow; and as the limit of the preopercle is also very narrow, the anterior portion of the cheeks are naked, a character unlike what is observed among its congeners. Lower edge of the preopercle smooth. Opercle wide, slightly convex, with radiating striæ. A broad loose transverse membrane beneath the lower jaw, covering the base of the branchial rays. The rudiment of a transverse ligament within, but no fleshy filament. Eyes large, vertical, one diameter and a half apart. Nostrils with subtubular margins, 0·2 apart. Minute acute recurved teeth on the jaws in several series. Teeth also on the vomer and palatines of the same character. Two small tuberosities on the nape, 0·2 behind the eyes.

The first dorsal fin arises 0·6 from the end of the snout, and is composed of four minute spines; the first three connected by a low membrane; the posterior postrate, and nearly

concealed in the skin. Second dorsal fin higher; gradually rising to the fifth ray, and descending again from the ninth ray. Pectorals long, reaching opposite the sixth ray of the second dorsal. Ventral fins contiguous, of six rays, of which the internal is longest, being 0·4 in extent. Anal fin not as high as the second dorsal, composed of twelve rays, and ending slightly beyond the termination of the dorsal. Caudal fin nearly even, with simple rays, projecting beyond the membrane, and composed of eleven entire and four accessory rays on each side.

Color. Back above greenish, and, with the extremity of the lower jaw, minutely punctate with black. First dorsal fin blackish. Pectorals greenish; the remaining fins white, tinged with yellow.

Length, 2·2. Depth, 0·6.
Fin rays, D. 4.1.12; P. 19; V. 1.5; A. 12; C. 11 $\frac{4}{4}$.

I have nothing to add to the history of this species, except that it has not yet been observed north of Carolina. I am indebted to Major Le Conte for an opportunity to examine this species. Through the carelessness of the engraver, the figure is represented of the natural size. I have little doubt but that one or more species will be found on the coast of this State. Mr. I. Cozzens, who is well acquainted with this genus, informs me, that some years since, he saw a specimen six inches in length, caught in the harbor of New-York. It had the exsertile filament mentioned above. He endeavored, but without success, to obtain the specimen, which he subsequently ascertained had been sent to England.

GENUS SPHYRÆNA. *Cuvier.*

Body elongated, with two distant dorsals. Lower jaw longest; both with long teeth. Ventrals post-pectoral, or placed towards the middle of the body.

Obs. The fishes included under this genus have long been arranged under the family Esocidæ, and indeed their general form and habits would lead one to associate them with the Pikes. They are, however, true Acanthopterygians, or fishes with bony rays; have two dorsal fins, and the intermaxillaries extend over the entire edge of the upper jaw. They have also numerous cæcal appendages, and their ventral fins are abdominal. Cuvier, in his last great work, places them at the end of the Percidæ, from which, however, they must be separated, as he observes, together with *Paralepis* and *Polynemus*, by a considerable interval. These three genera will, in all probability, form a distinct family. Most of the species of the genus Sphyræna, at certain seasons, are very poisonous; producing, when taken as food, vomiting and convulsions, and sometimes terminating in death.

THE NORTHERN BARRACUTA.

SPHRÆNA BOREALIS.

PLATE LX. FIG. 196. — (STATE COLLECTION.)

Characteristics. Small. Greenish above; lateral line yellow. Opercle with a single point. Length eight inches.

Description. Body elongated, subcylindrical. Depth one-eighth of the total length. Scales very small, adherent, orbicular, with minute concentric striæ; and under a strong lens, radiating striæ may be observed: they extend over the opercular bones. The course of the lateral line is very slightly sinuous, but nearly straight, and is manifested by a series of rather large scales, under the posterior edges of which are short tubes. Head produced, flattened, smooth, channelled above, rather more than one-fourth of the total length. Opercle large, emarginate, opposite to the base of the pectorals, pointed above and rounded beneath. Eyes large, oval, 0·4 in diameter, and about a diameter apart. Lower jaw longest, and furnished at the tip with a fleshy process. Teeth acute, pellucid, conspicuous on both jaws. In the lower jaw they are large, distant behind, and becoming smaller and more crowded towards the front, where two very large teeth are placed, and received into a cavity in the upper jaw. There are also two large incurved teeth in the upper jaw on each side, and numerous minute teeth along the edges of the intermaxillaries. Three long and slender teeth on the palatines of each side, and beyond them numerous minute teeth. On the tongue, also, are numerous recurved teeth.

The first dorsal fin commences at a point equidistant between the tip of the pectorals and the base of the ventrals: it is obscurely triangular, its height equal to its base, and composed

of five very slender rays; the first rather longer, and more slender than the others; the last connected to the back by a broad membrane. At the distance of one inch from the membrane of this fin, arises the second dorsal, slightly anterior to the origin of the anal: this fin is highest in front, emarginate, and comprises ten rays; the first slender, subspinous, simple; the others branched. The pectoral fins short, and composed of fourteen rays; the two superior short and simple. Ventral fins feeble, short and rounded, placed under the first dorsal; composed of one very slender, simple, and five branched rays. Anal fin similar in shape, though somewhat higher than the second dorsal, and placed beneath it. Caudal fin deeply forked, and comprises nineteen complete rays.

Color. When recent, green above; shining white beneath. The course of the lateral line indicated by a yellow line, which, in modified lights, gives a polished silvery reflection. Upper part of the head olive brown; sides silvery. Caudal fin bordered with yellow. The other fins white; second dorsal fin faint greenish. Irides silvery, tinged with yellow.

Total length, 8·0. Length of head, 2·4.
Fin rays, D. 5.1.9; P. 14; V. 1.5; A. 1.9; C. 19 $\frac{4}{4}$.

This is a very active and voracious little fish. A number of them were caught in the harbor of New-York, and placed in a vessel with several other species. In a few hours, they had destroyed them all, and then commenced devouring each other. It has not been very commonly observed, owing to the difficulty of capturing them; but I have reason to believe that they are not very rare. In its size, color and opercle, it differs very much from its great congener, the dreaded Barracuta of the South. The short notice of the *S. quachancho* (*Hist. Poiss.* Vol. 3, p. 342), renders it almost impossible to determine how far it is allied to our species. It certainly cannot be confounded with the *S. becune* of the same authors. It appears in August and September.

Of the Genus Polynemus, which follows, I have observed no species on the coast of New-York. Dr. Mitchill has indeed given a short notice of a species, which he names *Polynemus tridigitatus*, but I am induced to believe that it belongs to another family.

No species of the Genera Mullus and Upeneus, constituting the Family *Mullidæ*, have, to my knowledge, ever been seen on the coast of North America.

GENUS LEPISOMA.

Body and fins scaly. Fleshy filaments along the basal line of the head, and on the orbits. A single dorsal fin. Branchial rays six. Teeth in the jaws, vomer and palatines. Ventrals before the pectorals.

Obs. It is with much hesitation that I place this genus at the end of the jugular section of this family. In its general aspect, it might readily be referred to the families Scienidæ or Labridæ; but the presence of vomerine and palatine teeth exclude it from them.

THE CIRROUS LEPISOMA.

Lepisoma cirrhosum.

PLATE XXX. FIG. 94. — (CABINET OF THE LYCEUM.)

Characteristics. Soft portion of the dorsal higher and shorter than the spinous part. Length, six and a half inches. *Florida.*

Description. Body oblong, compressed, gradually tapering behind. Height at the pectoral, to its total length, as one to four nearly; at the tail, as one to twelve and a half. Scales moderate, rounded, finely striate on their free surfaces, with a smooth membranous margin, and with about twenty radiating plaits; the scales cover all parts of the body, and ascend far up the dorsal, caudal and pectoral fins. The lateral line commences at the upper angle of the branchial aperture, curves above the pectoral fin, and rather abruptly descends opposite the ninth dorsal ray, when it goes off straight: it is composed of a series of short tubes; the scales through which it passes are notched on their edges. Head somewhat arched on its facial outline, corrugated, and destitute of scales. Along the basal line of the head, on each side, are nine or ten fleshy processes, ending in bifid or trifid filaments, two-tenths of an inch long. Another fleshy process arises from beneath the upper margin of the orbit, which subdivides into six or eight smaller processes, each of which terminates in several slender filaments, not thicker than the finest thread, and some of them more than half an inch long. Eyes moderately large, 0.35 in diameter, and rather less than their diameters apart. The posterior nostril small, with a valvular margin; the anterior with a fleshy valve, through which is pierced the nasal aperture; its posterior elongated, and terminating in six or eight filaments. Opercle and preopercle rounded and smooth on their margins. Branchial membrane large, extending loosely around the throat, with six rays; the upper ray projecting behind the opercle in the form of a spine; a membrane subtended between this, and a weak subspinous process near the upper angle of the aperture. Lips fleshy. The mouth ample, opening as far back as the posterior margin of the orbits. Chin with numerous mucous pores. The lower jaw with a series of about thirty teeth; those in front, stout, blunt, sub-

equal and conical; on the sides, three or four, shorter, and conical, followed by more acute and distant teeth resembling those in front. Three series, containing about twenty smaller acute recurved teeth in front, behind the outer row. Tongue free, subacute, and corrugated. In the upper jaw, in front, is a series of equal conical slightly recurved teeth, somewhat longer than those below, smaller on the sides; behind the outer row, in front, is a patch of minute crowded teeth. Similar teeth in bands on the vomer and palatines. On the anterior part of the vomer, is a very large solitary tooth. Pharyngeals also covered with teeth.

The dorsal fin commences slightly posterior to the margin of the preopercle, and reaches nearly to the base of the caudal fin. It contains eighteen nearly equal robust spines, and twelve articulated rays nearly twice the length of the spinous part. All parts of this fin are so covered with small oblong scales, as to give it quite a peculiar appearance. The pectorals arise beneath the fourth dorsal ray, and the tip reaches to the third anal ray; it is broad, obtusely rounded, its rays protruding beyond the membrane, and covered high with small oblong scales. The ventrals arise near the inferior fold of the branchial membrane, and are composed of two long articulated rays, and a short rudimentary one on each side; their tips reach to within a quarter of an inch of the vent. Anal fin arises under the tenth dorsal ray, and terminates beneath the eighth ray of the soft portion of that fin. Its simple rays are sub-equal to the thirteenth ray, where they become longer; the sixteenth and seventeenth longest. Caudal fin nearly even, rounded; nearly equalling in length the ventral rays.

Color. Of this I can say nothing, as the fish had been preserved in spirits for many years. It appears to have been of a uniform dark brown, without spots or stripes, the head appearing somewhat darker.

Length, 6·5. Depth, 1·5. Width anterior to the pectorals, 0·7.
Fin rays, D. 18.12; P. 14; V. 3; A. 19; C. 10 $\frac{2}{2}$.

This remarkable species was brought from Florida about fifteen years since, and deposited in the Cabinet of the Lyceum, where it is labelled *Sciena fasciata*. I have learned nothing of its habits.

Of the second family, *Mullidæ*, I am not acquainted with any representative on the coast of North America. The *M. barbatus*, introduced into Smith's History of the Fishes of Massachusetts, does not exist on the coast of America.

FAMILY III. TRIGLIDÆ.

Suborbital bone extending over the cheek, and articulating behind with the preopercle. Head mailed or otherwise armed.

Obs. This family has many of the characteristics of the preceding, but is at once distinguished (as may be distinctly perceived in the figure of the *Dactylopterus volitans*) by the great development of the suborbital plates, which unite with the preopercle and cover the cheeks. Hence the term "Joues cuirassées," which has been translated *mailed cheeks*, and also *loricati*. We see no good reason for not adopting a name derived from some well known member of the family, and thus preserve a uniformity in the nomenclature of the class.

The family Triglidæ is allied on the one hand by *Uranoscopus*, which has its suborbitals largely developed, to the Percidæ, and on the other to the succeeding family of Scienidæ, by the absence of teeth on the vomer and palatines. It is divided by Cuvier and Valenciennes into twenty-nine genera; and they describe seventeen species, belonging to eight genera, on the coast and in the rivers of the United States.

GENUS TRIGLA. *Cuvier.*

Two dorsal fins; the first spinous, the second flexible. Body scaly. Three detached rays under the base of each pectoral fin. Head nearly square. The suborbitals nearly covering the whole cheek, projecting more or less beyond the snout, and united firmly to the preopercle. Teeth small, pointed, numerous, in both jaws, and in front of the vomer. Branchial rays seven.

Obs. But one species has been detected on our coast, where it appears to be an occasional visitor only.

THE RED GURNARD.

TRIGLA CUCULUS.

PLATE LXX. FIG. 225.

Trigla cuculus. LIN.
Polynemus tridigitatus. MITCH. Lit. and Phil. Soc. Vol. 1, p. 449.
La Rouget commun, T. cuculus. CUV. et VAL. Hist. Poiss. Vol. 4, p. 26.

Characteristics. Rose-red. Lateral line unarmed, and crossed throughout its length by lines not reaching below the middle of the sides. Length 8 – 12 inches.

Description. Body tapering, cylindrical, elongated. Back nearly straight. Head square, descending obliquely from the orbits to the point of the snout, and granulated. Nose with four projecting tooth-like processes on each side, belonging to the large suborbital plates; two or three small spines on the upper part of the orbits. The surscapular bone projects back-

wards, but not beyond the opercle. Opercle emarginate above, and ending in two points; the superior directed obliquely upwards; the lower scarcely longer, and is directed backwards. Preopercle flat, narrow above, enlarged beneath, with a slight ridge directed backwards, and ending in a small spine underneath the opercle. Mouth moderate, with a band of low even moderate teeth on the jaws, and a small transverse band on the anterior portion of the vomer. Tongue smooth. Lateral line nearly straight, unarmed, bifurcating near the tail. It is crossed by numerous short straight elevated lines. Scales over the body, small, oval, ciliate. Dorsal ridge strongly toothed.

The first dorsal fin triangular, and composed of nine robust spinous rays; the anterior minutely denticulated; the second longest, and it ends slightly in advance and above the vent. The second dorsal commences near the first, and is coterminal with the anal, containing eighteen subequal and (with the exception of the first) branched rays. Pectorals equal the head in length, are rounded, and comprise ten rays. There are three free articulated rays adjoining, and under the base of the pectoral fins. Ventral fins as long as the pectorals, and placed beneath them; the first is a short spine, and all are enveloped in a strong membrane: it comprises seven rays. Anal opposite the second dorsal, and somewhat shorter than that fin: it includes sixteen or seventeen subequal rays. Caudal fin crescent-shaped, with eleven entire, and four or five accessory rays on each side.

Color. Above, on the head, back, dorsal and caudal fins, bright red. Belly, ventral and anal fins, silvery, tinged with reddish. Pectorals bluish.

Length, 8·0 — 14·0.
Radial formula, D. 9.18; P. 10 + 3; V. 1.6; A. 16; C. 11 $\frac{4}{4}$.

Not having seen this fish myself on the coast of New-York, I have adopted the description from Cuvier and Valenciennes. They mention having received "a specimen from New-York, "which so much resembles the *T. cuculus*, not only in all its generalities, but even in its "most minute details, that it is very difficult for us not to consider it as the same species;" but they add, "as our specimen was not recent, it may possibly present some distinctive "characters."

There is great reason to believe that Dr. Mitchill had this species in view, when he made the short note of the *Polynemus tridigitatus* as cited above. I find no other mention of it among his numerous writings. His *Polynemus sexradiatus* belongs to the genus Dyctalopterus. It is possible that Smith had this species in view, when he describes the *Mullus barbatus* on the coast of Massachusetts.

The Red Gurnard is a well flavored fish, and highly esteemed in Europe. It feeds chiefly on crustacea.

GENUS PRIONOTUS. *Cuvier.*

Pectorals very large, and with numerous rays. A belt of velvet-like teeth on the palatines.

Obs. This is strictly an American genus, with many of its characters in common with Trigla. Thus, the head is square, and covered with bony plates; body elongated, rounded; two dorsal fins; teeth in the jaws, and in front of the vomer; gill openings ample; three free fleshy processes at the base of each pectoral fin.

THE BANDED GURNARD.

PRIONOTUS LINEATUS.

PLATE IV. FIG. 12. — (STATE COLLECTION.)

Trigla lineata, Gurnard or Sea Robin. Mit. Lit. and Phil. Vol. 1, p. 430, pl. 4, fig. 4.
Le Prionote striée, P. strigatus. Cuv. et Val. Hist. Poiss. Vol. 4, p. 86.
The Sea Robin, Gurnard, Grunter, Prionotus id. Storer, Mass. Report, p. 12.

Characteristics. A broad reddish brown line along the sides, below the lateral line. Length 12 – 18 inches.

Description. Head large, broader than the body, and composed of seven distinct bony plates; the first, which is roughened, covers the whole anterior and superior part of the head, and terminates behind in two robust spines. The anterior lobes of the snout obtuse, scarcely emarginate. Small spines over the eyes, at their anterior and posterior angles. A strong spine at the base of the preopercle, continued from a serrated bony carina. Opercle triangular, with two spines at its posterior extremity; the superior directed upwards; the inferior largest, and directed backwards: the surface of the opercle with radiating granulations. Eyes large, near the facial outline. Nostrils small, intermediate between the eyes and snout. Upper jaw projecting; both armed with numerous small teeth; those on the palatine arranged in a narrow belt or band. Humeral bone with a ridge, and terminating in a naked spine. Lateral line curves downwards from the upper part of the gill openings. Scales small. Three long fleshy processes arise under the base of the pectorals, the longest of which is nearly half the length of those fins.

The first dorsal fin is placed in a groove, and arises rather behind the branchial aperture; it is composed of nine stout rays: the first serrated along its whole length; the two following partially serrated; the third and fourth rays longest; the last very small. The second dorsal fin arises a short distance behind the first, and is composed of twelve subequal rays. The pectoral fins, which are so large as to form one of the generic characters, extend to the middle of the second dorsal: it is very broad, obtusely pointed, and, exclusive of the fleshy processes which are by some authors considered as forming a portion of this fin, it comprises thirteen rays. Ventral fins placed beneath the pectorals, with one short spinous and five soft

rays. Anal fin with eleven subequal rays, and coterminous with the dorsal. Caudal nearly even, slightly lunated.

Color. Dark brown above, passing into slate, with numerous irregularly distributed darker blotches. Sides and abdomen cream-colored, with ferruginous blotches more or less conspicuous. Lateral line brownish. A broad reddish brown longitudinal band extends from under the spine of the humeral bone, along the sides of the body, beneath the lateral line, to the tail; at its posterior extremity, it becomes a series of interrupted short lines and spots. First dorsal light-colored, with a black irregular spot between the fourth and sixth rays. Pectorals very dark, with numerous transverse reddish bars. Anal and caudal fins reddish.

Length, 9·0 – 18·0.
Fin rays, D. 9.12; P. 13 + 3; V. 1.5; A 11; C. 15.

This species is not uncommon, and is known under the various popular names of *Grunter*, *Gurnard*, *Sea Robin*, and *Flying Fish*. As the description of Mitchill is perfectly recognizable, I see no reason why his name, which, although inapplicable to a Trigla, has not been anticipated under *Prionotus*, should not be retained. The banded gurnard is seldom eaten as food.

THE WEB-FINGERED GURNARD.

PRIONOTUS CAROLINUS.

PLATE V. FIG. 15. FIG. — UPPER SIDE OF THE HEAD. — (STATE COLLECTION.)

Trigla carolina. LINNEUS, Mantissa, p. 528. Fide CUV. et Val.
Trigla palmipes, Web-fingered Gurnard. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 431, pl. 4, fig. 5.
Le Prionote de la Caroline, Prionotus carolinus. CUV. et VAL. Hist. Poiss. Vol. 6, p. 90.
Web-fingered Grunter, P. carolinus. STORER, Mass. Report, p. 14.

Characteristics. Pectoral processes dilated at their extremities; the first ray of the second dorsal crenated. Length twelve inches.

Description. Body cylindrical, tapering towards the tail. Scales small, subquadrate, with radiating striæ on the concealed surface, and with denticulations on the external edges. Lateral line following the slightly concave curve of the back, from which it is 0·8 distant. Head depressed, abruptly declivous, with a deep depression between the eyes, and ending in a bilobate snout. Each projecting lobe is furnished on its anterior margin with short blunt spines, in one or more series, projecting over the upper jaw. These lobes are separated by a distinct interval, are prolongations of the suborbital bones, and are covered by strong asperities. A distinct furrow from the infero-anterior portion of the orbit, on each side, defines the internal boundaries of these bones. In this furrow, at a distance of three quarters of an inch from the end of the snout, may be observed on each side the small nostrils; and at a short interval behind, the second pair. Orbits stoutly spinous in front. The spines vary in number from two to four, are directed backwards, and may be considered as partially protecting the

eyes. The upper edge of the orbit trenchant, with serratures; and from this proceed backwards two nearly parallel spinous ridges, the inferior shortest, the superior ending in a spine opposite the second ray of the first dorsal. The preopercle triangular, with a long slender spine at its lower angle, directed backwards, and at right angles to its posterior margin. Opercle with radiating furrows, and one slender triangular spine, which is serrated along its upper edge; and another shorter one above, concealed in the membrane. The humeral bone furnished with a stout spine, its broad base being marked with a series of depressions and elevated serratures. The first branchial arch with long setæ or rakers; the others with a series of alternate tubercles. Tongue broad at its base, and smooth, terminating in front in a small abrupt tip. A band of fine incurved card-like teeth on the intermaxillaries, separated in the centre by a distinct interval. A similar, but continuous band on the lower jaw. An arcuated interrupted band of card-like teeth on the palatines. The teeth on the pharyngeals disposed above in four irregular patches; beneath, in a single triangular patch on each side.

The first ray of the first dorsal shorter than the second, and with it strongly crenate; the third and fourth subequal; the last scarcely appearing above the surface, but connected with the preceding by a low membrane, and very near the second dorsal: all these rays are stoutly spinous, and may almost be entirely hidden in a deep furrow. The second dorsal fin is not so much elevated; its first ray crenated. Pectorals very large and broad, reaching to the fifth ray of the second dorsal; its first ray slightly spinous. The fingers or fleshy processes varying in length from 1·5 to 2·3 inches, the inferior shortest, the upper longest: they serve as important organs of touch, as the nerves leading to them are exceedingly large. Ventral beneath the pectorals, with the tip of its longest rays extending as far back as the antepenultimate ray of the first dorsal; its first ray short and subspinous; fourth and fifth rays subequal and longest. Anal higher than the dorsal, with rays simple, or feebly divided at the tips; coterminal with the dorsal, but commences under the second ray of that fin. Caudal fin slightly crescent-shaped, with numerous accessory rays. Vent equidistant between the anterior digitated process and the termination of the anal fin. The air-bladder double, elliptical, placed side by side, and communicating with each other at their middle portions by a large opening; on their inferior surfaces, they are covered by a long and broad gland.

Color, of the body, greyish, or rather chocolate-brown. Branchial membrane bluish. Dorsal and anal fins with pale oblique bars. The first dorsal fin with a dusky subocellate spot between the fourth and fifth rays. Pectorals and caudal bluish. Pectoral digitations brown near the base, then reddish brown, and yellow towards the tips, where they are margined with brilliant gamboge yellow, which becomes effaced at the extremity. Pupils black; irides yellow. Four to six obscure brownish bands across the back, becoming obsolete on the sides. Inside of the mouth white in front, deep black behind.

Length, 13·0. Greatest depth, 3·0.
Fin rays, D. 10.14; P. 14; V. 5; A. 12; C. 11 $\frac{5}{4}$.

This is a very rare species. In the course of twenty years, I have not met with more than six or eight individuals. The last one I examined, had its stomach completely distended with remains of crabs, among which I detected the *Crangon septem-spinosus* and *Platyonichus ocellatus*. It is evident from the phrase of Linneus, "digito longior," that he described from a young individual. Among the drawings of Dr. Holbrook of the fishes of Carolina, I notice this, which must be considered as a southern species, occasionally only reaching these latitudes. It occurs, however, still farther north at the island of Nantucket.

THE SPINOUS GURNARD.

PRIONOTUS TRIBULUS.

PLATE LXX. FIG. 226.

Le Prionote chaussetrape, Prionotus tribulus. CUV. et VAL. Hist. des Poiss. Vol. 4, p. 98, pl. 74.

Characteristics. Pectoral reaching the end of the anal fin. All the spines of the head acute, and flattened like sword-blades. Length 8 inches.

Description. Body shaped as in the preceding. A small spine in the centre of the radiations on the large suborbital. All the spines of the head, and especially those on the posterior parts of the orbits, and on the point of the surscapulary bone, more distinct than in the preceding, and are sharpened and compressed like sword-blades; the preopercular and clavicular spines are, moreover, broader and more acute: this is most obvious in the males. The band of palatine teeth exceedingly narrow. The pectoral fin equals almost the length of the body, reaching to or even beyond the end of the anal fin.

Color, much as in the preceding. The first dorsal fin has a black spot between the fourth and sixth ray. The second with two black spots along its base; one from the fifth to the seventh, the other between the fourth and sixth ray. Pectorals blackish, more especially on the interior, where the upper border is whitish. Body brownish above, lighter beneath.

Length, 6·0 – 8·0.
Fin rays, D. 10.13; P. 13 + 3; V. 1.5; A. 12; C. 11.

Cuvier states that he has received numerous specimens of this species from New-York. I have never seen but very small individuals, which I had confounded with *P. lineatus*. It ranges from New-York to Charleston, and is probably found in the intertropical seas.

(*EXTRA-LIMITAL.*)

P. punctatus. (CUV. et VAL. Vol. 4, p. 93.) Two small spines on each side of the snout. Fins spotted. Length 12 inches. *Antilles.*

GENUS DACTYLOPTERUS. *Cuvier.*

The pectoral fins excessively developed, and composed of two portions, forming a large fin which serves as a wing. Head flat, granulate. Body covered with hard carinated scales. Preopercle armed with a long spine. Ventrals with but four soft rays. Teeth in the jaws, but not on the vomer or palatines.

Obs. This genus, as now restricted by Cuvier, comprises but two species; one from the Indian ocean, and the other known from the earliest antiquity, and common in the Mediterranean sea. This latter is also found along the shores of South America, and is not uncommonly brought by the gulf stream along our coast as far even as the Banks of Newfoundland.

THE SEA SWALLOW.

DACTYLOPTERUS VOLITANS.

PLATE XVII. FIG. 46. BACK OF THE HEAD AND SCALES ENLARGED. — (STATE COLLECTION.)

Trigla volitans. LIN. p. 498.
Morcielago. PARRA, Descripcion, &c. p. 25, pl. 14.
Polynemus sexradiatus. MITCHILL, Mem. pl. 4, fig. 10. Supplement Month. Mag. Vol. 2, p. 323.
Le Dactyloptère commun, D. volitans. CUV. et VAL. Hist. Poiss. Vol. 4, p. 117.

Characteristics. First ray of the dorsal slightly longer than the succeeding; a short triangular crest between the first and second dorsals. Length six inches.

Description. Body cylindrical, tapering towards the tail. Head cubical or four-sided, wider than high. Length of the head, to the total length, as one to five. Body covered with rough solid scales, dentate on their free margins, and with a prominent crest on each, which is finely toothed (see figure). These crested scales become effaced on the abdomen. They are evident on the back, but become most conspicuous in five or six rows along the flank, which gradually coalesce, the upper and under row becoming more and more elevated, until they terminate in two highly crested plates on each side of the tail. Sixty-five scales are enumerated from the opercle to the tail, and thirty-four from the dorsal to the centre of the abdomen. Head broader than high, flattened above with a broad furrow between the orbits, descending nearly vertically in front; the whole helmet being covered with deep granulations. The suborbital bones advance, and nearly approach in front, their whole margins being strongly crenated; posteriorly they terminate in two points, with a broad emargination between them; the one above forming a portion of the orbit; the other beneath longer and more acute, terminating at the inner angle of the preopercle. The preopercle terminates in a long stout spine, which extends beyond the base of the pectorals, with a prominent ridge on its surface, furnished with teeth directed forwards; its lower margin is likewise dentate. The sur-scapulars terminate on each side above in a very robust broad spine, which reaches as far as the penultimate ray of the first dorsal (see figure). On the surface of each spine is a strong crenate

ridge. The opercle itself is very small, and covered with scales. Gill openings small, with six branchial rays, which are difficult to be counted. Mouth small, not terminal; the lower jaw shortest, and both with fleshy lips. Teeth minute, short, conical, forming a patch of three or four rows on each side of the jaws. Card teeth on the pharyngeals; palate smooth. Eyes large, 0·4 in diameter, and 0·7 distant from each other. Nostrils double; the inferior small and tubular.

The first dorsal fin composed of two nearly free and flexible filaments, which are nearly abreast of each other, and united near the base by a low membrane; closely contiguous to these, but not united to them by a membrane, follow four feebly spinous rays, united together by a membrane, and the rays diminishing in length backwards. Both this and the following fin are lodged in a groove. Between this and the second dorsal is a short immovable triangular crest, the "stiff spiny stump" of Mitchill. The second dorsal fin is composed of eight simple articulated rays, the two last of which are bifid; it terminates over the end of the anal. The pectorals may be described as consisting of two portions; the anterior 1·3 long, of six rays, with their tips free, and the fourth and fifth rays longest; the posterior portion, or pectorals proper, extends nearly to the base of the caudal fin, and rounded. This contains thirty rays; they increase in length to the ninth; the nine following are subequal, when they rapidly decrease in length, the five or six ultimate ones being exceedingly short and rudimentary. The ventral fins are placed under the base of the pectorals; the first simple; the remaining four articulated; the third 1·2 in length, and longest; the last ray very short and feeble. The anal fin commences under the third ray of the second dorsal, and contains six subequal rays. Caudal fin crescent-shaped, of ten entire articulated rays, and five accessory rays on each side; the last of the accessories more than half the length of the external ray.

Color. Light brown above, (darker on the summit of the head,) with irregular darker spots. Sides silvery, with flesh-color, which latter is predominate beneath. Dorsals grey, with brown spots on the membrane of the first, and the rays of the second annulated alternately with brown and lighter. The posterior pectorals blackish, with bluish iridescent spots; the anterior dark brown, varied with black. Ventrals and anal fins flesh-colored. Caudal fin light brown, with irregular brownish bands.

Length, 6·0. Depth, 1·0.
Fin rays, D. 2.4.1.8; P. 6.30; V. 1.4; A. 6; C. 10 $\frac{5}{5}$.

This curious species, which presents so many striking anomalies in its structure, was first noticed on our coast by Parra in his Description of the Aquatic Animals of Cuba in 1787. Dr. Mitchill, in his Memoir on the Fishes of New-York in 1814, gave a good figure of this species; and in his supplement to this memoir, in the American Monthly Magazine in 1818, furnished a detailed description which sufficiently establishes its identity with *D. volitans*. I am inclined to think that five is the normal number of rays in the first dorsal; as in three others which I obtained in the harbor of New-York, I found constantly that number. In these cases, however, there was but one free ray in front, terminating in a fleshy filament. The subject of our examination was caught in a net in the harbor, in the month of August. If

our species be identical with that of Europe, it has a wide geographical distribution. On the American coast, it ranges from Brazil to Newfoundland.

By means of its immense pectorals, it is enabled to spring from the ocean, and support itself for some time in the air. This is often done to escape its enemies. It feeds on various small crustacea.

GENUS COTTUS. *Cuvier.*

Body without scales. Ventrals under the pectorals, and with three or four rays. Teeth velvet-like, on the jaws and anterior part of the vomer; palatines smooth. Head large, depressed. Body gradually tapering to the tail. Opercle or preopercle armed with spines, occasionally both. Dorsals distinct, or slightly connected. Branchial rays six. No air-bladder.

Obs. Cuvier has enumerated and described sixteen species. A few inhabit fresh-water lakes and streams, but the greater part are oceanic, inhabiting the northern seas.

THE COMMON BULL-HEAD.

Cottus virginianus.

PLATE V. FIG. 13.—(STATE COLLECTION.)

Scorpius virginianus. Willughby, Hist. Pisc. App. p. 25, pl. 10, fig. 15.
Cottus scorpius, Sea Toad. Schœpff, Beobachtungen, etc. Vol. 8, p. 145.
Eighteen-spined Bull-head, C. 18-spinosus. Mitch. Lit. and Phil. Soc. Vol. 1, p. 380.
Le Grand Chaboisseau à 18 épines de l'Amérique du nord. Cuv. et Val. Hist. Poiss. Vol. 4, p. 181.
The Common Sculpin, C. virginianus. Storer, Fishes of Massachusetts, p. 18.

Characteristics. Very large. Spine of the preopercle reaching the point of the opercle. Pectorals very broad, and rounded. Length, 12 – 18 inches.

Description. Head broad, channelled above, and equal to one-third the length of the body. The head is furnished with robust recurved spines in the following order: One near each nostril; one over each orbit, and one on the nape of the neck on each side. In addition to these, there are three on the preopercle, the uppermost of which is an inch long, the lower directed forwards; and one on the subopercle, which in fact makes a total of twenty spines instead of eighteen. Gape of the mouth very large, and capable of still farther dilatation at the will of the animal. Fine card teeth on both jaws, in broad bands; also on the vomer. Tongue broad and smooth. Eyes large, and furnished with prominent orbits. Nostrils small and tubular. The body diminishes gradually from the head, and becomes compressed towards the tail.

The first dorsal fin spinous, longer than high; the second ray longest. A very short interval separates it from the second, which is long, not as elevated as the first, and feebly

spinous; the fourth ray longest. Pectorals very broad, rounded, and composed of seventeen rays. Ventrals long and feeble. Anal fin nearly even, and almost as long as the second dorsal. Caudal fin long, even, undivided.

Color. This is subject to great variation in different individuals, but the following is the most usual appearance: Body marbled with black and green above, sometimes with deep olive; beneath whitish, occasionally bronzed, or with a tinge of yellow. Eyes yellow and brownish. Dorsal fins with brown spots disposed in oblique bars, which are most apparent on the membrane of the second dorsal. The first dorsal dark brown, with black spots, and varied with white; the posterior part of the membrane of this fin constantly light-colored, tinged with greenish. Pectoral fins yellow, or rather buff-colored, with brownish concentric bands. Ventrals white, tipped with yellow. Anal fin frequently barred like the second dorsal. Caudal fin dull yellowish, with broad parallel brownish bars; yellow on its outer margin.

Length, 12·0 – 18·0.
Radial formula, D. 8.16; P. 16; V. 3; C. 11.

This species, which, on account of its uncouth form, is regarded with aversion by fishermen, is nevertheless not a bad article of food. In fact, when freshly taken from the water, and irritated, they do present rather a formidable appearance. The head is swollen to twice its usual size by the distension of the branchial membrane; the spines stand out prominently, and the rays of all the fins become erect. It is known under the various popular names of *Sculpin*, quere *Scorpion? Sea Robin*, *Bull-head*, *Sea Toad*, and *Pig Fish;* the latter from its croaking noise when drawn from the water. It ranges from Virginia to Newfoundland, and perhaps still farther north.

THE BRAZEN BULL-HEAD.

COTTUS ÆNEUS.

PLATE VI. FIG. 19. — (STATE COLLECTION.)

The Brazen Bull-head, Cottus æneus. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 380.
Le Chaboisseau bronzé, C. id. CUV. et VAL. Hist. Poiss. Vol. 4, p. 189.
The Brazen Bull-head, C. id. STORER, Fishes of Massachusetts, p. 20.

Characteristics. Lateral line rough, with asperities beneath it. Dorsals nearly equal in height.
Length 5 – 6 inches.

Description. Head broad, flat, and deeply channelled between the orbits, which are large and prominent. The spines about the head nearly similar in number and situation with those of the preceding species, but not so obvious or distinctly pronounced. One or two small spines at the commencement of the lateral line, which is very distinct, straight, and rough to the touch. The dorsal fins united, but the connection not always very obvious; the first ray of the second dorsal much shorter than the succeeding: this fin reaches nearly to the caudal. Lower jaw much shorter than the upper. On the gill-cover, a trifid spine: one

directed upwards and backwards, and is the longest; the second directed downward, and the third smallest. The opercle itself terminates in a long slender spine. The tips of the pectoral extend beyond the first dorsal. Tail even, slightly rounded.

Color. Above dark brown, obscurely mottled with black; sides mottled with reddish brown and black; beneath yellowish white, or with patches of white and orange. Sides of the cheeks brazen. All the fins yellowish or light brownish, with interrupted brownish bars.

Length, 5·0 – 6·0.
Fin rays, D. 10.15; P. 15; V. 3; A. 10; C. 12 $\frac{3}{3}$.

This species is frequently taken with the hook in Long Island sound, and the harbor of New-York. It rarely exceeds six inches in length, and is usually not more than four. Mitchell's enumeration of the fin rays nearly accords with our own, except in the caudal fin, where the discrepancy arose no doubt from his having included the accessory rays. A specimen in the Cabinet of the Lyceum, named by Dr. Mitchill himself, leaves no doubt as to the identity of the species. It bears, however, a striking resemblance to the *C. bubalis* of Euphrasen (Mem. Acad. Stockhol. 1786), and which is also figured by Cuvier, pl. 78.

The geographic range of this species is at present limited to the coasts of Massachusetts and New-York. It probably ranges farther north.

THE SMOOTH-BROWED BULL-HEAD.

COTTUS MITCHILLII.

PLATE XVII. FIG. 47. — (STATE COLLECTION.)

Cottus scorpio? MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 381.
C. mitchilli. CUV. et VAL. Hist. Poiss. Vol. 4, p. 188.

Characteristics. Orbits unarmed. Preopercle with four spines. Anal fin with eleven rays. Length two to three inches.

Description. Body deepest at the origin of the first dorsal, and less than one-third of its total length. Lateral line prominent, curved, concurrent with the back. Head sloping, excavated on the nape, broadly channelled between the eyes, and descending in an arched manner to the snout. Two minute spines directed backwards on the basal line of the head; another pair anterior to the orbits, and so placed as to be nearly between, but rather within a line drawn between the anterior and posterior nostrils. Preopercle with four spines; the upper 0·1 and longest, directed upwards, the next backwards, the third downwards, and the fourth obliquely forwards: the first is furnished with a fleshy slip. Opercle with a spine above forming a ridge on the surface, and a pointed membranous flap beyond; and another smaller directed downwards, and nearly opposite the centre of the base of the pectorals. Orbits 0·2 in diameter, and distant half their diameters, their planes forming less than a right angle with the plane of the base of the lower jaw. A spine on the supra-scapulary, and

another stouter on the upper portion of the humeral bone. Nostrils tubular. Lower jaw received within the upper, and both with numerous sharp incurved minute teeth, which may be traced on the vomer. Tongue with faint asperities.

The first dorsal fin arises 0·9 from the end of the snout, and contains ten feebly spinous rays: the first is shorter than the second, and the three last are successively shorter; it is connected by a low membrane with the second, which rises immediately behind it (in the figure this is not shown): it comprises fourteen rays, and ends beyond the termination of the anal fin. Pectorals broad, with sixteen rays; the inferior shortest, and gradually increasing in length to the ninth ray. Ventral fin with three subequal rays, reaching nearly to the vent. The anal fin commences under the second ray of the posterior dorsal, and contains eleven rays, nearly as high as the dorsal. Caudal fin long, nearly even, with nine complete and four accessory rays on each side.

Color. Yellowish, more or less bright, with confluent bars and blotches over the back and sides. All the fins with interrupted black bars. The ventrals more distinctly marked with three black bars. Head and cheeks brownish olive.

Length, 3·3. Greatest depth, 0·9.
Fin rays, D. 10.14; P. 16; V. 3; A. 11; C. 9 $\frac{4}{4}$.

I suppose this to have been the species intended by Mitchill under the name of *C. scorpio*, and to which Cuvier has given the name of *C. mitchilli*. It can scarcely be (as that distinguished ichthyologist has suggested) the young of the large Common Bull-head. The spines of the preopercle and the radial formula render it highly probable that it is a small and distinct, but hitherto neglected species. It has the habits of the preceding, and is commonly taken with the hook, in company with the *Pluronectus planus*, and other flat fishes.

THE GREENLAND BULL-HEAD.

COTTUS GRŒNLANDICUS.

PLATE IV. FIG. 10.

Cottus scorpius. FABRICIUS, Fauna Grœnlandica, p. 156.
Cottus quadricornis. App. to Parry's 1st and 3d Voyages.
Cottus grœnlandicus. CUV. et VAL. Hist. Poiss. Vol. 4, p. 156.
Greenland Bull-head, C. grœnlandicus. RICHARDSON, F. B. A. Vol. 3, p. 46; and p. 297, pl. 95, fig. 2.
Greenland Sculpin, C. Id. STORER, Massachusetts Report, p. 16.

Characteristics. A quadrangular area on the head, bounded by four tubercles. Circular white spots on the abdomen. Length twelve to fourteen inches.

Description. Head with several spines; those on the summit blunted; those on the gill-covers longer, with projecting sharp points. Nasal spines recurved, three inches long. At the posterior superior angles of the eyes, a strong slightly recurved spine, stouter than the nasal ones. Two erect stronger spines on the occiput: between these and the preceding, is

a quadrangular depression. The preopercle has three spines, two of which are placed at its upper angle; the superior of these spines is much the largest, and points upward; the third and smallest is directed downward. Opercle with two spines; the larger at its upper angle; the other at its lower angle, much smaller. A prominent scapular spine. Eyes circular, 0·5 in diameter. Gape of the mouth very large. Upper jaw longest. Jaws armed with numerous very small teeth. Nostrils tubular; three lines in front of the eyes.

The first dorsal fin arises above the branchial aperture, and is composed of ten rays; the second dorsal fin is nearly continuous with it. Pectoral fin broad, extending beyond the end of the first dorsal; the underside of many of its rays granulate. Ventral fins small. Height of the anal fin, half of its length. Sides of the body, above and beneath the lateral line, roughened by granulated tubercles.

Color. Above dark brown, with large clay-colored blotches on the top of the head and on the gill-covers, with a few smaller ones on the back and sides. Small circular yellowish spots on the sides, towards the abdomen. Large circular perfectly white spots on the abdomen, beneath the pectorals. First dorsal fin dark brown, variegated with yellow; second dorsal brown, with several oblique yellowish bars. Anal fin yellowish, with narrow oblique brown bars. Caudal with blackish rays, the membrane yellowish.

Length, 13·0 – 14·0.
Fin rays, D. 10.18; P. 17; V. 3; A. 13; C. 16.

I have never met with but one specimen of this species, which was captured near Hellgate. It was too much injured for description, and I have therefore availed myself of the excellent account furnished by Dr. Storer. I am indebted for the figure to Dr. Richardson.

It is very abundant on the coast of Massachusetts, and as its name implies, extends to the arctic circle. It is probable that this coast is its extreme southern limit. It is exceedingly voracious, devouring small fish, crabs, sea eggs, etc., but is held in no estimation as an article of food.

(*EXTRA-LIMITAL.*)

C. cognatus. (Richardson, F. B. A. Vol. 3, p. 40.) Dark brown; sides clouded. Allied to *C. gobio* of Europe, but the dorsal and anal fins higher. D. 8.18; P. 15; V. 1.4; A. 14; C. 15. Length, 4 inches. *Great Bear Lake.*

C. polaris. (Sabine, App. Parry's 1st Voy.) Light, with minute dusky spots. Two strong spines before and between the eyes. D. 6 or 8.15; V. 5; A. 15; C. 12 or 14. Length, 2 inches. *Polar Seas.*

C. hexacornis. (Rich. F. B. A. Vol. 3, p. 44.) With six club-shaped erect processes on the head. D. 7.13; P. 16; V. 3; C. 12. Length, 6 or 7 inches. *Coppermine River.*

C. porosus. (Cuv. et Val. Vol. 8, p. 498.) Body covered with small pores. A series of small bony plates between the lateral line and dorsal. D. 11.1.16. Length, 6 inches. *Northern Seas.*

GENUS HEMITRIPTERUS. *Cuvier.*

Head and body with numerous fleshy slips. Velvet-like teeth on the jaws, vomer and palatines. A single dorsal, deeply divided, or separated into two fins.

Obs. Of this genus, I am not aware that more than one species has been observed on our coast, although the varieties dependent on color are numerous. It appears to hold an intermediate station between *Cottus* and *Scorpio;* and the species to be now noticed, has been placed in either genus by various writers.

THE AMERICAN SEA RAVEN.

HEMITRIPTERUS AMERICANUS.

PLATE VI. FIG. 16. ½ NATURAL SIZE.—(CABINET OF THE LYCEUM.)

Acadian Bull-head. PENN. Arct. Zool. Vol. 3, p. 118?
Cottus hispidus et *tripterygius.* BL. SCHN. pl. 13; Dict. Sc. Nat. Vol. 11, p. 15.
Scorpena flava, Yellow Scorpena. MITCHILL, Lit. and Phil. Vol. 1, p. 382, pl. 2, fig. 8.
Scorpena purpurea? et *rufa?* ID. Am. Month. Magazine, Vol. 2, p. 245. (Varieties.)
H. americanus. CUV. et VAL. Hist. des Poiss. Vol. 4, p. 268, pl. 84.
H. id. GRIFFITH, Cuv. An. Kingdom, Vol. 10, p. 141, pl. 53, fig. 3, a.
The Sea Raven, H. americanus. STORER, Fishes of Massachusetts, p. 23.

Characteristics. Yellow or blood-red; varied with brown. Length, one to two feet.

Description. Body oblong, cylindrical, tapering rapidly to the tail. Head large, with irregular cavities, knobs and elevations. Supra-orbital margin elevated, and furnished with two strong spines; four rows of irregular spines extending from the orbits to the nape. Above the snout, an elevated crest on each side, with spinous projections, and a broader intermediate eminence. From several of these prominences, arise various cutaneous digitated cirri or slips; ten or twelve of these are also pendant from the lower jaw. Summit of the head very concave between the orbital crests. Surface of the body covered with a granulated skin; on which, more particularly above the lateral line, are disposed in rows small conic tubercles. Preopercle with three spines, the lowest being very small. Opercle terminating in a blunt point, and with elevated spinous ridges on its surface. Branchial membrane six-rayed. Jaws equal and rounded. Card teeth in both jaws, on the vomer, palatine and pharyngeal bones. Tongue smooth and large. Lateral line indicated by a series of tubercles, and concurrent with the dorsal outline.

The first dorsal fin, or rather the spinous portion, commences well on the nape, somewhat anterior to the ventrals, and extends to a point above the origin of the anal fin; the first ray longest; the second and third suddenly decreasing to the fourth and fifth, which are low and subequal; from these, the rays lengthen through the sixth, seventh, eighth and ninth, which are subequal, when the rays again shorten to the last: the tips of most of these rays are furnished with fleshy slips or appendages. The second dorsal arises so immediately behind

the first, as to have been considered but one by some writers: indeed, in the specimen before me, it is actually connected by a membrane: this fin terminates above the end of the anal; its middle rays are longest, nearly equaling in height the first rays of the anterior dorsal. The pectoral fins wide, oval, and attached obliquely behind the gills, the tips of the longest rays extending to the space between the first and second dorsals. Ventral fins small, and composed of a short, stout and blunt spine, and of three soft rays, of which the middle is longest. Anal fin equaling in extent the second dorsal; the rays are longest behind. Caudal fin very slightly rounded, nearly even.

Color. The whole surface of the head, body and fins, of a bright lemon-yellow. In a variety described by Mitchill as *S. purpurea*, the color is russet-brown, varied with whitish and yellowish blotches; abdomen pale orange yellow. Another variety, his *S. rufa*, has a more uniform reddish hue, unclouded.

Length, 12·0–24·0.
Radial formula, Br. 6; D. 16.14; P. 18; V. 1.3; A. 14; C. 12 $\frac{3}{3}$.

This beautifully colored but oddly shaped fish, of which I have seen but two specimens, is comparatively rare on our coast. It is known by fishermen under the names of *Sea Raven* and *Sea Sculpin*, and is taken in company with the cod along the coast. Its skeleton has thirty-nine vertebræ, sixteen abdominal and twenty-three caudal. Pyloric orifice with six cæcal appendages. The urinary bladder very large. No air-bladder. Feeds on the smaller fishes.

The Sea Raven is subject to great variations in its color, from bright lemon-yellow to carmine. It is a northern species, not extending south of New-York, and becoming more abundant as we proceed north.

GENUS SCORPÆNA. *Linneus.*

Head spinous and tubercular as in the preceding genus, but laterally compressed. Dorsal fin undivided. Seven branchial rays. Body with scales. Cutaneous processes adhering to the head and sides. Teeth similar in shape and position to the preceding.

THE SMALL SEA SCORPION.

SCORPÆNA PORCUS.

Scorpæna porcus. LINNEUS.
La petite Scorpène brune. CUV. et VAL. Hist. Poiss. Vol. 4, p. 300.

Characteristics. Brown; beneath rosaceous, variegated with lighter colors. Scales very small. Length 8 – 10 inches.

Description. Body oblong; dorsal line curved; abdomen often prominent. Nostrils placed behind each other, and nearer to the eye than to the end of the snout. Head shorter and body deeper than in *S. scrofa.* Scales very small and rough. Sixty are enumerated in a longitudinal series, and forty in a vertical line; longer than broad, minutely striated, and ciliated on their outer margins, and with eight or nine plaits at their bases. Six small cutaneous slips at the end of the snout, two on the orbit, and one on the crest of the cranium; a few very minute ones on the cheek, but none on the cheeks or sides of the body. The first spinous ray of the dorsal fin one-third less than the second, and thence gently increasing to the eleventh; the soft portion half the extent of the spinous part. Anal fin with three stout short spines. Caudal rounded.

Color. Brown, tinged with reddish beneath, which also appears on the ventrals and anal.

Length, 8·0 – 10·0.
Fin rays, D. 12.9; P. 18; V. 1.5; A. 3.5; C. 11 $\frac{4}{3}$.

I have never met with this species, and have availed myself of the description given by MM. Cuvier and Valenciennes, who received it from New-York. It is common in the Mediterranean, and along the southern shores of Europe. It is one of the few fishes which cross the Atlantic. Feeds on the smaller crustacea.

THE SPOTTED SEA SCORPION.

SCORPÆNA BUFO.

PLATE LXX. FIG. 227.

Rascacio. PARRA, Descripcion de diferentes, &c. p. 34, pl. 18, fig. 1.
Scorpæna bufo. CUV. et VAL. Hist. des Poiss. Vol. 4, p. 306.
The Sea Toad, S. bufo. RICHARDSON, Faun. Bor. Fishes, p. 300.

Characteristics. Base of the pectorals beneath black, sprinkled with round milk-white spots. Length seven inches.

Description. From thirty to thirty-three spines on the head and shoulders, viz. one on the nasal bone; five on the elevated margin of the orbit; three in a row extending backwards from the orbital ridge to the nape; five in a row parallel to the above, commencing close to the orbit, passing over the temples, and ending on the shoulders, (the posterior part of this row is doubled, adding two spines more;) four divergent ones on the anterior suborbital; three on the ridge of the second suborbital, traversing the cheek obliquely; six on the preopercle; and two on the opercle, the last tips the humeral bone immediately above the pectoral. Bands of teeth narrow on the jaws, vomer and palatines. Velvet teeth on the pharyngeals. Nasal spine more or less denticulated.

Color. Brown, marbled with rosaceous and violet. The dorsal, between its sixth and seventh rays, has a large black spot.

Length, 7·0.
Fin rays, D. 12.9; P. 19 or 20; V. 1.5; A. 3.5; C. 13 $\frac{5}{3}$.

This species has been observed from the Caribbean sea to Newfoundland, and of course will be detected on our coast. I have not met with it, and have extracted the above from the descriptions of Cuvier and Richardson. The figure, although indifferent, is the only one I had access to, and is copied from Parra.

GENUS SEBASTES. *Cuvier.*

Head covered with scales. No cirri. Eyes large. Opercular bones with several spines. Branchial rays seven. A single dorsal fin, composed of spinous and flexible rays. Teeth small, numerous, on the jaws, vomer and palatines. Lower rays of the pectorals flexible.

Obs. This genus, now comprising about ten species, was first separated by Cuvier from *Scorpæna*, with which it has many characters in common. On our coast, we have one species common to both shores of the Atlantic.

THE NORTHERN SEBASTES.

SEBASTES NORVEGICUS.

PLATE IV. FIG. 11.

Perca norvegica. MULLER, Zool. Dan. p. 46, pl.
Le Sebaste septentrionale, S. norvegicus. CUV. et VAL. Hist. Poiss. Vol. 4, p. 327, pl. 87.
Norway Haddock, S. norvegicus. YARRELL, British Fishes, Vol. 1, p. 73, fig.
The Northern Sebastes. RICHARDSON, Faun. Bor. Am. Fishes, p. 52.
The Norway Haddock, S. norvegicus. STORER, Fishes of Massachusetts, p. 26.

Characteristics. Uniform red above; silvery beneath, without darker blotches or bands. Length, one to two feet.

Description. Body oblong, compressed, covered with small oval roughened scales, extending over all the head, and a part of the dorsal, anal and caudal fins: ninety are counted in the length of the fish, and thirty to forty in a vertical line from the pectorals. Lateral line concurrent with the back, and composed of a series of about thirty-six tubes. Head flattened above, and one-third of the total length. Preopercle rounded, with five spines; opercle with two; sub and inter-opercle with one spine each. Scapular bones with two spines; suborbital with two. Four spines on the supra-orbital ridge, a minute one beneath, and two others projecting backward. Mouth wide; upper jaw very protractile, with a notch in the centre for the reception of the lower jaw. Lower jaw with a prominent chin, and three large pores under each branch of the jaw.

The dorsal fin compound, with fifteen spinous rays, which are so distant from each other as to make the base of this portion double the length of the other, although containing only the same number of rays; soft portion twice the height of the spinous portion. Pectorals rounded, as wide as long; the ten upper rays branched; the nine lower articulated, but simple: all the rays extend somewhat beyond the membrane. Ventrals slightly behind the pectorals; of one spine, and five branched rays. Anal with three spines, of which the first is short and robust, with seven or eight branched rays twice the length of the posterior spinous ray. Caudal fin slightly excavated behind.

Color. All the head and body above, together with the fins, of a carmine red. A brown blotch on the posterior part of the opercle. Beneath lighter, and in the recent fish of a bright rose-red. Pupils black; irides yellow.

Length, 12·0 – 24·0.
Fin rays, D. 15.15; P. 19; V. 1.6; A. 3.8; C. 15.

This is a very rare fish in our waters. It is called, by our fishermen, *Red Sea Perch*, and they say it is only found in deep water. By the fishermen of Massachusetts, it is known under the various names of *Rose-fish*, *Hemdurgon*, and *Snapper*. Fabricius states that it is rather agreeable food, but meagre. In Greenland, the lips are eaten raw. It feeds on flounders and other fish, and takes the hook readily. It is a native of the northern seas, found on the coast of Newfoundland rather abundantly, and more rarely along the seaboard of Massachusetts. The coast of New-York is probably its extreme southern limit.

GENUS URANIDEA.

Head wide, depressed. Body without scales. Two dorsals. Ventrals with three rays. Eyes nearly vertical. Opercle smooth; preopercle with a single spine. Teeth on the jaws, vomer and tongue.

THE LITTLE STAR-GAZER.

URANIDEA QUIESCENS.

PLATE V. FIG. 14. — (STATE COLLECTION.)

Characteristics. Olive-brown, varied with dusky. Tail long, even. Length two to three inches.

Description. Head large, depressed, with the angles of the jaws much dilated. No scales were noticed, even with the aid of the lens. A series of mucous pores on the upper part of the head. Lateral line near the back, and concurrent with it. Eyes large, and nearly vertical. Mouth very large, with minute recurved teeth on the jaws, vomer and tongue. A stout sword-shaped spine, 0·1 in length, on the preopercle. Branchial rays seven.

The first dorsal fin is low and rounded, and composed of seven simple feebly spinous rays, and arises near the anterior third of the body; it is separated by a very short interval from the second dorsal fin, which is higher than the first, and composed of sixteen slender rays gradually diminishing behind. Pectoral fins very large, broad and rounded. (In some of the impressions, the right pectoral is drawn so incorrectly, that it appears like a third dorsal.) The tips of the pectorals extend to the second or third ray of the posterior dorsal. Ventrals very long, placed immediately under the pectorals, and composed of three very slender rays. The anal fin corresponds in its origin nearly with the second dorsal, but terminates short of

it, with thirteen rays. The tail is very slender, and the caudal fin, which is even, contains but thirteen rays. The membranes of all the rays are exceedingly thin and delicate.

Color. Above minutely punctate with olive-brown, and varied with obscure darker blotches; abdomen soiled white. Head blackish brown above. Pectoral and caudal fins tinged with orange, and both obsoletely marked with three or four interrupted bands.

Length, 2·0 – 3·0. Depth, 0·25.
Fin rays, D. 7.16; P. 13; V. 3; A. 13; C. 13 $\frac{3}{3}$.

This curious little fish, which is strongly allied by its form to *Uranoscopus*, was first pointed out to me by my friend Dr. Emmons, in a small stream emptying into Round lake, Hamilton county. We subsequently detected it in Lake Pleasant, in the same county. It lies quiescent for a long time near the bottom, and moves slowly in search of food. When disturbed, it darts suddenly forward with great velocity. Occasionally it takes the hook.

GENUS ASPIDOPHORUS. *Lacépède, Cuvier.*

Body much elongated, and covered with scaly plates. Head depressed. Snout with recurved spines. Minute velvet-like teeth in the jaws, vomer and palatines. Branchial rays six.

THE AMERICAN ASPIDOPHORE.

ASPIDOPHORUS MONOPTERYGIUS.

PLATE II. FIG. 6.

Agonus monopterygius. BL. SCHN. p. 104.
L'Aspidophore à une seule dorsale. CUV. et VAL. Hist. Poiss. Vol. 4, p. 224, pl. 169.
Cottus monopterygius. RICHARDSON, Faun. Bor. Am. Fishes, p. 50.
Aspidophoroides id., The Bull-head. STORER, Fishes of Mass. p. 22, pl. 1, fig. 1.

Characteristics. Small; with a single dorsal. Body octagonal. Length four to six inches.

Description. Body elongated, quadrangular in front of the dorsal fin, tapering gradually to the tail, and covered with eight series of plates on the body and six on the tail. Head broad; orbits large and prominent, with a deep furrow between. The snout in advance of the orbits is concave, and surmounted by two small recurved spines at its extremity; and a third, smaller, behind. The opercle with a spinous process. Mouth small, with fleshy lips, with short velvet teeth on each jaw. Scales hexagonal, with radiated striæ. Dorsal fin placed in a furrow between the angles of the large dorsal plates, which exists from the nape to the tail. Dorsal and caudal fins rounded; (in the figure, drawn from an imperfect specimen.)

Color. Light brown, with six transverse dark semi-bands.

Length, 4·0 – 6·0.
Fin rays, D. 5; P. 10; V. 1.2; A. 5; C. 16.

I have never had an opportunity of seeing this rare species, and have copied from Storer his figure of one found on the coast of Massachusetts. It occurs in the Arctic seas, is unimportant as an article of food, and is very rare.

GENUS CRYPTACANTHODES. *Storer.*

Body anguilliform, compressed, gradually tapering to the tail, without scales. Head broad, with no projecting spines but the angles of the gill-covers. The scapular and humeral spines, and the lower edge of the preopercle, prominent to the touch. Branchial rays seven. A single dorsal, with strong spinous rays, and united with the caudal and anal. No ventral fins. Teeth in the jaws, vomer and palatines.

Obs. This genus was established by Dr. Storer, for the reception of a remarkable fish which appears occasionally on the seacoast of Massachusetts.

THE SPOTTED WRY-MOUTH.

CRYPTACANTHODES MACULATUS.

PLATE XVIII. FIG. 50. AND WITH THE HEAD ENLARGED.—(CAB. BOST. NAT. HIST. SOCIETY.)

Cryptacanthodes maculatus, Spotted Wry-mouth. STORER, Mass. Rep. p. 28.

Characteristics. Reddish brown, with darker reddish blotches, forming two longitudinal series, on the sides. Length twelve to twenty inches.

Description. Body elongated, compressed, scaleless. Lateral line straight, with the appearance of interrupted dots. Head large, flattened above, with several bony processes and ridges; two prominent ones running from the orbits backwards to the occiput. The posterior angles of the opercle and preopercle, the whole lower edge of the latter, and the scapular bones, all seem like sharp points and edges concealed under the skin. Opercle small, 1·0 long, rounded on its lower margin, acute behind; its upper margin forming a bony ridge, and united to the preopercle by a membrane at its upper angle. Preopercle large; its upper and posterior angles obvious to the touch; its lower edge sharp, and feeling as if divided into two ridges. Branchial membrane capacious, dilatable, and forming a large fold above the base of the pectorals, where it unites with the common skin. Eyes moderate, nearly vertical, 0·3 in diameter, and 0·63 apart; the intervening space between the orbits depressed, with numerous pits or cavities. Nostrils tubular, and placed on a line with the upper margin of the orbits, at the edge of the intermaxillaries. Mouth wide, terminal, opening obliquely upwards. Lips large and fleshy. Minute straight conic teeth disposed in bands on the jaws, with an intermediate free space in the middle; a patch of similar teeth on the vomer; several series of longer and more acute and recurved teeth on the palatines.

The dorsal fin arises 3·4 distant from the end of the snout, and nearly above the middle of the pectorals; it is united to, and continuous with the caudal: all its rays are stoutly spinous

and subequal, except a few of its anterior rays, which are shorter; they are all enveloped in a stout thick membrane. Pectoral fins small, obtusely pointed at the tip, and rounded beneath; the fifth, sixth and seventh rays longest. The vent is placed beneath the twenty-eighth or twenty-ninth dorsal ray. Immediately behind the vent, commences the anal fin, which is similar in its form, and the character of its rays, to the dorsal fin. Caudal elongated, obtusely pointed.

Color. Reddish white, with an interrupted series of irregular dark brown blotches extending from the pectorals to the tail; more numerous towards the tail, and large at the anterior part of the body.

Length, 12·0 – 21·0.
Fin rays, D. 77; P. 13; A. 50; C. 19.

This very curious and rare species, which in its form approaches the genus *Trypauchen* of the family *Gobidæ*, and in the absence of ventrals might be referred to some groups of the *Anguillidæ*, was first described by Dr. Storer of Boston, and referred under a new and appropriate genus to the present family. Among this family it will form a new group, characterized by its anguilliform body, and the absence of ventral fins.

I take this occasion to express my obligations to Dr. Storer, for placing this and other specimens in my hands for examination and comparison. I am thus enabled to give a figure of this rare and singular species. Nothing is known of its habits. One of the only three specimens known, was obtained from the stomach of a haddock. It is probably a northern species.

GENUS GASTEROSTERUS. *Artedi.*

Body without scales, with more or less plates on the sides. One dorsal fin, with free spines before it. Branchial rays three. Bones of the pelvis united, and forming a shield, pointed behind. Teeth in the jaws; none on the vomer and palatines.

Obs. This group comprises numerous small species, found in the ocean and in fresh-water streams. They are exceedingly active in their movements, and have been observed to throw themselves to a great distance out of water. They are very pugnacious, and when confined, will destroy each other. Their food consists of the fry of other species, of which they destroy great numbers. A single individual has been known, in five hours, to devour seventy-four young dace, and on the following day, sixty-two. Some of the species appear to possess the property of changing their color. In some parts of England, they are so numerous as to be employed as manure.

THE TWO-SPINED STICKLEBACK.

GASTEROSTEUS BIACULEATUS.

PLATE III. FIG. 9. — (CABINET OF THE LYCEUM.)

Two-spined Stickleback. PENN. Arct. Zool. Suppl. (No description.)
Gasterosteus biaculeatus. MITCH. Lit. and Phil. Soc. Vol. 1, p. 430, pl. 1, fig. 10.

Characteristics. With two distant spines on the back, and a third near the dorsal. A strong serrated spine on each side, representing the ventrals. Length 2½ inches.

Description. Body compressed, tapering away to a very small caudal extremity. Body on each side covered by a series of from twenty-eight to thirty narrow vertical plates, striated perpendicularly on their surface, and faintly denticulated on their posterior margins. Vent with an anterior pouch, analogous to that observed in *Syngnathus*. The course of the lateral line near the back is indicated by a series of prominences, finally terminating on the carinated side of the tail. This carina is high and membranous, and when viewed from above, resembles lateral finlets. The humeral bone terminates above the base of the pectorals, in a flat point. The ventral spine on each side is 0·3 long, acute, serrated on each side, with a prominent flattened process on each side of the base. A flat lustrous silvery plate between the pectorals and the branchial orifice. Head flattened above, with numerous impressed punctures arranged in rows. Eyes large. Nostrils midway between the latter and the point of the jaw. Teeth exceedingly minute, with a broad velum across the upper jaw. The place of the first dorsal occupied by two distant, slightly curved, compressed spines, serrated on their edges, and each furnished behind with a short membrane; a third, similar in shape, but smaller, near the dorsal fin; all are much enlarged at their bases; the anterior two 0·3 long, the posterior 0·1.

The dorsal fin longer than high; its anterior rays longest, composed of one spine and twelve simple rays. Pectoral fins elongated, and containing ten rays. The ventrals represented by a single spine on each side, as described above. Between these spines is a long triangular plate, with a central elevated ridge; its surface striated transversely in front, with angular striæ behind, and terminating in a sharp point, as represented in the plate; its use appears to be, to support the abdominal pouch. The anal fin commences posterior to the origin of the dorsal, and is longer than high, slightly excavated on its margin, and contains one bent short spine and eight rays. The caudal fin contains twelve rays, and is slightly emarginate.

Color. Dark olive-green above, gradually intermixing with light greenish and yellowish on the sides. Fins more or less tinged with yellowish.

Length, 2·5. Greatest depth, 0·5.
Fin rays, D. 2.1.12; P. 9; V. 1; A. 1.8; C. 12.

Found about New-York in the salt-water streams, and I have noticed them in the Hudson as far up as Albany, where the water is fresh. I cannot reconcile the *Epinoche à deux épines* of Cuvier and Valenciennes (Vol. 1, p. 503), with its naked tail, and its robust flat and sharp tooth at the external base of the ventral spines on each side, with our New-York species.

THE NEW-YORK STICKLEBACK.

GASTEROSTEUS NEOBORACENSIS.

PLATE VI. FIG. 17.

Gasterosteus aculeatus New-York. SCHŒPFF, Beobacht. Vol. 8, p. 167.
L'Epinoche de New-York. CUV. et VAL. Hist. Poiss. Vol. 4, p. 502, pl. 98, fig. 3.

Characteristics. A soft and flexible spine at the base of the ventral spines on each side. Tail armed. Length two inches.

Description. Body fusiform, compressed; sides with a series of from thirty to thirty-three transverse plates. The lateral line concurrent with the back, from which it is generally 0·1 distant: it is prominent throughout its whole course; but about the nineteenth or twentieth lateral plate, it becomes elevated into sharp compressed spines, which form a distinct ridge along each side of the tail. Head small, covered with striate bony plates, flattened above, and sloping in a straight line from the nape. Mouth slightly protractile, with a vertical aspect; the lower jaw longest. Eyes large. Opercular bones with obsolete striæ, and without spines or denticulation. Minute subequal teeth in a single row on each jaw; none elsewhere. Tail very slender.

The first dorsal spine 0·2 long, acute, placed above the base of the pectoral, and with a broad base; serrate on the sides, and furnished with a membrane. The second dorsal spine above the fourth lateral plate; and beyond this, and directly over the ventral spine, is another similar in shape and size to the preceding; a third, which is scarcely 0·1 in length, and somewhat curved, is placed near the dorsal fin.

Dorsal fin long, composed of thirteen rays, of which the anterior are largest, and gradually decrease in length to the last. Pectorals long and rounded, the tips of the rays (eleven in number) extending beyond the second dorsal spine. The place of the ventrals supplied by a single ray on each side; the ossa innominata forming a long solid triangular plate, terminating in a point behind, and covering the lower part of the abdomen nearly to the vent: the junction of the plates forms a prominent roughened carina. The ventral spine itself has a dilated base, and is distinctly toothed on its side; it reaches nearly to the tip of the abdominal shield. Under each ventral spine is a soft flexible spine, the use of which is not apparent, unless it be to replace the loss of the larger one. Anal fin long, slightly emarginate, with one curved spine and twelve branched rays. Caudal fin with thirteen rays, and emarginate.

Color. Plumbeous grey or bluish above; silvery on the sides and beneath.

Length, 2·0. Depth, 0·5.

This species is very closely allied to the preceding, and resembles, as Cuvier has observed, the *G. trachurus*, or common Three-spined Stickleback of Europe. I have noticed them frequently thrown ashore on the beach of the ocean, completely exenterated, but their bony cuirass preserving their form entire.

THE FOUR-SPINED STICKLEBACK.

GASTEROSTEUS QUADRACUS.

PLATE VI. FIG. 18. — (STATE COLLECTION.)

Gasterosteus quadracus. MITCHILL, Tr. Lit. and Phil. Soc. Vol. 1, p. 430, pl. 1, fig, 11. (Bad.)
G. id. et *apeltes.* CUV. et VAL. Hist. des Poiss. Vol. 4, p. 505.
G. apeltes, Bloody Stickleback? STORER, Mass. Report, p. 31.

Characteristics. Olive-green, marbled with dusky. Sides not cuirassed. Three or four spines before the dorsal. Length one or two inches.

Description. Body compressed, highest opposite the first dorsal spine; back arched. Tail exceedingly slender. Head small, descending. In front of the dorsal fin are three and occasionally four moveable spines, with a small membrane attached to each, all lying in a groove; the first longest, the others successively shorter. The dorsal fin commences a short distance behind the spines, with one contiguous spine and twelve articulated rays; the anterior soft rays are largest; the whole fin is received into a groove. Pectorals feeble, and composed of twelve slender rays. Ventrals reduced on each side to a single stout triangular spine, serrated on its anterior edge. The os innominatum beneath is elongated on each side, above the spiny ventral, until it reaches the vent: these are "the lateral spines" of Mitchill. Anal fin with an acute recurved spine, and ten soft rays. Caudal fin emarginate, with thirteen rays.

Color. Silvery plumbeous above; whitish beneath, often marbled with dusky on an olive-green ground.

Length, 1·0 – 2·0.
Fin rays, D. 3 or 4.1.12; P. 12; V. 1; A. 1.10; C. 13.

This species abounds in our waters. Cuvier and Valenciennes describe the *apeltes* as a species "qui pourrait bien être celle que M. Mitchill a eue sous les yeux, quoiqu'elle réponde "assez mal à sa description." Dr. Storer describes a membrane attached to the ventral spine, which escaped my notice. A typographical error in that gentleman's description, makes him attribute but five rays to the dorsal fin.

In a monography of *Gasterosteus*, or in a general Systema, it will be found necessary to consider this species as the type of a new genus, including perhaps *concinnus*, for which the name of *Apeltes* would be sufficiently characteristic.

THE MANY-SPINED STICKLEBACK.

GASTEROSTEUS OCCIDENTALIS.

PLATE XLII. FIG. 135.—(STATE COLLECTION.)

L'épinochette de Terra-neuve. CUV. et VAL. Hist. Poiss. Vol. 4, p. 509.
The Ten-spined Stickleback, G. pungitius. STORER, Fishes of Mass. p. 32.

Characteristics. With more than seven spines in front of the dorsal fin. Tail armed. Length one to two inches.

Description. Body elongated, compressed, tapering from the origin of the dorsal fin. Head small; eyes prominent. Nostrils round, simple, and contiguous to the orbits. Mouth vertical. Sides of the tail distinctly carinated, with from twelve to fourteen distinct plates. Dorsal spines ten in number, incurved, placed in a groove, and alternately directed to the right or left; the first is slightly in advance of a line vertical to the base of the pectoral fins. The dorsal fin high, subtriangular, and composed of one stout spine and seven soft rays. Anal fin beneath the preceding, and similar to it in shape, with one spine and nine soft rays. Ventral spines triangular, acute; a buckler extended into a point behind, between the ventral spines, with from four to six transverse furrows between those spines. Caudal fin elongated, rounded.

Color. Olive-green, with a tinge of yellow.

Length, 1·5 – 2·0.

Fin rays, D. 10.1.7; P. 11; V. 1; A. 1.9; C. 13.

Although this species differs somewhat in its radial formula from the *occidentalis* of Cuvier, yet its elongated slender form and carinated tail has led me to refer it to that species. Subsequent observations must verify the truth of this conjecture. It will scarcely be referred, I think, to the *G. pungitius* of Europe.

This little species is found both in fresh and salt water. I have specimens caught in the harbor of New-York, in company with the *Syngnathus fuscus;* and also from a fresh-water pond on the island of New-York, near the Deaf and Dumb Asylum, where the communication with the sea is interrupted during the greater part of the year.

(*EXTRA-LIMITAL.*)

G. mainensis. (STORER, Bost. Jour. Vol. 1, p. 464.) Back with seven spines, the last longest; a broad oblong serrated plate on the side; with numerous dusky transverse bands. Length two inches. Fresh water. *Maine.*

G. niger. (CUV. et VAL. Vol. 4, p. 503.) Entirely black; tail armed; ventral spines very long. 33 lateral plates. Two inches. *Newfoundland.*

G. concinnus. (RICHARDSON, F. B. A. Vol. 3, p. 57.) Body scaleless; tail slightly keeled on the sides; nine dorsal spines. Length an inch and a quarter. Fresh water. *Northern Regions.*

G. inconstans. (KIRTLAND, Zool. Ohio, p. 191, ined.)

FAMILY IV. SCIENIDÆ.

No teeth on the vomer or palatines. Denticulations or spines on the opercular bones. Mouth not protractile. Cheeks not mailed. Scales on the bases of the vertical fins. With one or two dorsal fins. Teeth various.

This family resembles the *Percidæ* in many particulars, such as the various denticulations or spines on the opercular pieces, the variations in the dorsal fins and the branchial rays, etc., but are at once distinguished by their smooth palate. Some of the genera of the preceding family, with smooth palates, appear to constitute a connecting link or passage from the *Percidæ* to the family now under consideration. The *Scienidæ* have all a peculiar aspect, and may in general be readily recognized by their arched snout, and by the scales which ascend high upon the vertical fins; they have the habits of the Perch family, and in general are excellent food. The species are for the most part inhabitants of the intertropical seas; none are common to both continents, and a great majority of the species are American. Many of them make a grunting noise, which Cuvier supposes may possibly be connected with their complicated air-bladder.

The species already known exceed two hundred and fifty, which have been distributed by Cuvier under thirty-one genera.

GENUS LEIOSTOMUS. *Cuvier.*

Anal spine feeble. Very minute denticulations on the preopercle. Teeth in the jaws even, and excessively small. Pharyngeals paved on their posterior border. Snout convex, arched. Two dorsals.

Obs. The name of this genus was formed by Lacépède, upon the erroneous idea of the total absence of teeth. Cuvier first assigned its proper characters.

THE LAFAYETTE.

LEIOSTOMUS OBLIQUUS.

PLATE LX. FIG. 195.

Mugil obliquus. Mitchill, Report in part, etc., p. 16.
Labrus id., Little Porgee. Id. Lit. and Phil. Soc. Vol. 1, p. 405.
Sciena multifasciata. Lesueur, Acad. Nat. Sciences, Vol. 2, p. 255.
Le Léiostome à épaule noire, L. humeralis. Cuv. et Val. Hist. Poiss. Vol. 5, p. 141, pl. 110.

Characteristics. Fourteen to eighteen transverse oblique bands over the back. A dark rounded spot behind the upper angle of the opercle. Length 6 to 8 inches.

Description. Body compressed. Back gibbous, rapidly descending to the nape. Snout blunt. Eyes large. Nostrils double; the posterior oblique, largest. Three or four pores at

the end of the jaw. Scales small, ciliate, covering the head and body. Lateral line distinct, and concurrent with the back. Jaws equal. Teeth so minute as to be visible only with a lens. Preopercle minutely denticulate.

The first dorsal triangular, with its first ray short, and equal to its last; the third, fourth and fifth rays longest; separated by a very short interval from the second dorsal, which is long and low, its rays (except the first) equal, and ending posterior to the termination of the anal. Pectorals long, scaly at the base, and composed of twenty branched rays. Ventrals slightly behind the pectorals, with one short and five branched rays. Anal excavated on its margin; its anterior spine almost concealed in the skin. Caudal fin lunate, covered high up with small scales.

Color. Whitish, with from twelve to eighteen dark greyish bars directed obliquely forward, more vertical behind. Irides yellow; pupils black. Fins yellowish; dorsal and anal fins minutely punctate with black. A round blackish brown spot on each side, more or less distinct, on the lateral line, above the base of the pectorals.

Length, 6·0 – 8·0. Of head, 1·6 – 1·8. Depth, 2·0 – 2·5.
Fin rays, D. 9.1.30; P. 20; V. 15; A. 2.12; C. 19.

This beautiful little fish, which furnishes a delicate article of food, is usually rare in our waters, but visits us in almost incredible numbers at irregular and generally distant intervals. One of these visits happened to coincide with the arrival of the great and the good La Fayette at New-York, in the summer of 1824. His name was unanimously given to a fish, which was considered as entirely new, and this name it still retains. It must be very common on the southern coast, but I cannot find that it has in those parts received any popular name. If I am correct in supposing that the *S. multifasciata* of Lesueur, described from a dried specimen, is identical with the *Lafayette*, it is common on the coast of Florida. Thus far, there is reason to believe that the coast of New-York forms its extreme northern geographic limits. I see no good reason for changing the prior and characteristic name given to it by Dr. Mitchill.

(*EXTRA-LIMITAL.*)

L. xanthurus. (Cuv. et Val. Vol. 5, p. 142.) Unspotted; without bands. Fins, and especially the caudal, yellow. D. 11.1.32; A. 2.13. Length six or eight inches. *South-Carolina.*

GENUS OTOLITHUS. *Cuvier.*

Two stout canine teeth in the upper jaw, and occasionally in the lower. Two small pores on the lower jaw, or entirely wanting. Two dorsal fins. Air-bladder bifid in front. Anal spines feeble or obsolete. Body elongated.

THE WEAK-FISH.

OTOLITHUS REGALIS.

PLATE VIII. FIG. 24.

Johnnius regalis. SCHN. Scuteeg und Scuppaug. SCHŒPFF, l. c. p. 169.
Roccus comes. MITCHILL, Report in part on the Fishes of N. Y. 1814, p. 26.
Weak-fish, Labrus squeteague. ID. Lit. and Phil. Soc. N. Y. Vol. 1, p. 396, pl. 2, fig. 6.
L'Otolithe royal, O. regalis. CUV. et VAL. Hist. Poiss. Vol. 5, p. 67.
Sciena (Otolithus) regalis. RICHARDSON, Fauna Bor. Am. Fishes, p. 68.
O. regalis, Squeteague, Weak-fish. STORER, Fishes of Massachusetts, p. 33.

Characteristics. Bluish above, varied with dusky. Ventrals and anal orange. Ventrals with five branched rays. Length one to two feet.

Description. Body elongate, compressed. Head slightly arched over the eyes. Scales moderate, oval, transparent, minutely striate and denticulate, covering the gill-covers and summit of the head to the end of the nose. The lateral line curved slightly, but not concurrent with the back; it may be traced to the tips of the caudal rays. Nostrils double, placed in a triangular cavity anterior to the eye; the one nearest the orbit vertically oblong, the other round and subtubular. Eyes large, the lower jaw longest, furnished with a row of distant acute subequal teeth, and in front with two or three rows of smaller ones. Similar but smaller ones above in the intermaxillaries, and from one to three long fang-like teeth in front of the upper jaw. Ranges of minute teeth on the pharyngeals, to which is attached an orbicular process, which is festooned on its margin. Branchial rays seven: the first branchial arch with long flat processes, strongly dentate on their inner edges; the others with short alternate tubercles. Opercle with two obsolete flattened points, scarcely discernible through the membrane. Preopercle with a minutely crenate membranous margin.

Dorsal fins two; the first triangular longer than high, of eight simple feebly spinous rays, of which the first is shorter than the second; the third longest. Equidistant between this and the succeeding fin, is a short feeble isolated spine. The second dorsal fin is long and subequal; the first ray is short, and so closely in contact with the next as to be separated with difficulty. The third is longest; and from this, the rays insensibly diminish to its termination somewhat beyond the anal. The pectoral fins extend as far as the middle of the first dorsal, and, with the exception of the first, which is simple, contain seventeen branched rays. Ventral fin stout, with one simple and five very ramose rays. The anal fin short; the third ray

equal to the length of its base; the first simple, very short; the remaining branched rays twelve. Caudal somewhat lunulated, of seventeen rays, the exterior simple.

The gall-bladder long and tubular. Four cæcal appendages. The intestine makes two convolutions. Air-bladder very thick, and of the shape represented in the figure; on its inner surface is a long red glanular body, the uses of which have not been ascertained.

Color. Bluish above, with irregular transverse series of dark spots on the back and sides. Summit of the head greenish blue; interior of the mouth with a yellowish tinge. Irides yellow. Gill-covers and inferior surface silvery lustrous. Chin with bright salmon-colored tints. Upper vertical fin and the caudal fin brownish. Pectoral fins brownish yellow. Ventrals and anal orange.

Length, 13·0. Depth, 3·0.
Fin rays, D. 8.1.28; P. 18; V. 1.5; A. 13; C. 17.

The *Weak-fish*, so called from the feeble resistance it makes on the hook, and the facility with which it breaks away from it, by reason of its delicate structure, was formerly one of our most common salt-water fishes. The average size is not more than six or eight inches, but I have been informed of one weighing thirty pounds. Of late years, it has greatly diminished in numbers on our coast; and as the *Temnodon saltator* or *Blue-fish* of the south has appeared here in great numbers, the disappearance of the former is supposed to be in some way connected with the appearance of the latter. Dr. Storer has made a similar observation on the coast of Massachusetts.

The aboriginal name given to this fish by the Narragansets was *Squeteaugue*, corrupted into *Squettee*; the Mohegans named it *Checouts*. Although extensively eaten, it may be ranked among those of a secondary quality.

Its extreme northern range yet ascertained, extends to the Gulf of St. Lawrence. It is not uncommon at New-Orleans, where it is called *Trout*, and has been captured at Martinique.

(*EXTRA-LIMITAL.*)

O. carolinensis. (Cuv. et Val. Vol. 9, p. 475.) Scales small; more than eighty in a longitudinal line. Blue on the back, with silvery reflexions. Anal blackish blue. D. 10.1.27; A. 1.11. Length fourteen inches. *South-Carolina.*

O. drummondi. (Richardson, F. B. A.) Slender. Two distinct rows of teeth in the upper jaw. Caudal rounded. Anal 1.8. Length eleven and a half inches. *New-Orleans.*

GENUS CORVINA. *Cuvier.*

Branchial rays seven. Teeth generally even, velvet-like on the jaws; but with a series of teeth larger, pointed and equal on the upper jaw. Dorsals two, or deeply divided. Snout arched. Spines of the anal moderate or robust. No barbules.

Obs. This genus is distinguishable from *Sciena* and *Otolithus* by the size and length of the anal spines; and from the latter more particularly by the absence of canines. The want of cirri or barbules distinguishes it from *Pogonias* and *Umbrina*. About thirty-five species have been described from various parts of the world. They occur in salt and fresh water, but principally in the former.

THE LAKE SHEEPSHEAD.

CORVINA OSCULA.

PLATE XXI. FIG. 63. — (STATE COLLECTION.)

Sciena oscula. LESUEUR, Journ. Acad. Nat. Sciences, Vol. 2, p. 252, pl. 13.
Le Corb de Lesueur, Corvina oscula. CUV. et VAL. Hist. Poiss. Vol. 5, p. 98.
C. id. KIRTLAND, Bost. Jour. Vol. 3, p. 350, pl. 6, fig. 3; Ohio Report, p. 193.

Characteristics. Anterior profile sloping, somewhat concave. Snout prominent, rounded. Length 12 – 18 inches.

Description. Body compressed above, wider beneath. Back arched and gibbous. Scales shorter than wide, slightly denticulated, small and crowded above and beneath the pectorals, and covering the base of the dorsal and caudal fins. Lateral fin distinct, concurrent with the back, and may be traced far up the caudal fin. Eyes large, prominent, rounded, near the facial outline. Minute and scarcely perceptible serratures on the preopercle. Mouth small. Teeth in the jaws small, conic, equal; the outer series somewhat more robust. Pharyngeals with large rounded and paved teeth. Five pores on the lower jaw.

First ray of the spinous portion of the dorsal fin very short; the third slightly longer than the second, and longer than the others; the ninth slightly longer than the first. The first ray of the soft portion spinous; the remainder subequal, branched, and ending beyond the termination of the anal fin: its rays vary from twenty-eight to thirty-one. Anal fin with two spines and eight soft rays; the first very short, stout and acute; the second six times longer, and very robust. Caudal rounded at the tips.

Color. Bluish grey on the back; darker on the nape and snout. Abdomen and chin greyish white.

Length, 15·0. Depth, 4·5.
Fin rays, D. 9.1.28; P. 19; V. 1.5; A. 2.8; C. 17 $\frac{3}{3}$.

This is a very common fish in Lake Erie, and is called at Buffalo, *Sheepshead*. Unlike the Sheepshead of the ocean (*Sargus ovis*), it is a poor, dry and tasteless fish, and is scarcely ever eaten. It also occurs in Lake Ontario. It does not appear to have been seen by Richardson in the upper lakes. It feeds on many of the fresh-water shells, such as Cyclas, Paludina, &c. Its air-bladder is very large and simple.

THE SILVERY CORVINA.

CORVINA ARGYROLEUCA.

PLATE XVIII. FIG. 51.

Silvery Perch, Bodianus argyroleucos. MITCH. Lit. and Phil. Vol. 1, p. 417, pl. 6, fig. 9.
Le Corb blanc d'argent. CUV. et VAL. Hist. des Poiss. Vol. 5, p. 105.

Characteristics. The four first spinous rays of the dorsal fin successively longer. Scales white and silvery. Ventral and anal orange-yellow. Length eight inches.

Description. Body compressed; back arched; facial outline sloping. Snout somewhat produced. Scales moderately large, rough on their margins. Lateral line concurrent with the back. Eyes large. Mouth deeply cleft. Teeth very minute, disposed in a narrow band. Preopercle with two small spines, or, as they may be termed, strong distant teeth, the lower directed downwards; the remainder of the margin with small serratures. Opercle ending in two flat obtuse points. Lower jaw with four minute pores.

Dorsal fin compound, deeply emarginate; the first portion is spinous, with eleven spines, of which the first is very short, the fourth longest; the posterior portion with two short spines and twenty-two soft rays, of which the anterior from the fourth are longest. Pectoral fins moderate. Ventral fins beneath and slightly behind the pectorals, with a sharp spinous ray. Anal fin short, higher than long, with two stout spinous rays. Caudal fin nearly even, slightly rounded.

Color. Silvery white on the body and side; dead white or opake beneath. Irides yellowish white. Second dorsal, pectorals and caudal fin, yellowish. Ventrals and anal orange-yellow.

Length, 8·0. Depth, 3·0.
Fin rays, D. 11.2.22; P. 17; V. 1.5; A. 2.9; C. 17.

This fish has so much the port and habit of a perch, that it is frequently called *Silvery Perch* by the fishermen. It is not uncommon in our waters, in the summer season. It is a native of the Caribbean sea, and extends its northern range to the coast of New-York.

THE BRANDED CORVINA.

CORVINA OCELLATA.

PLATE XXI. FIG. 61. — (CABINET OF THE LYCEUM.)

Perca ocellata. LIN. Syst. Nat.
P. id., Bass in Carolina. SCHŒPFF, Vol. 8, p. 166.
Centropome œillet. LAC. Vol. 4, p. 254.
Lutjanus triangulum. ID. Vol. 4, p. 181.
Beardless Drum, Sciena imberbis. MITCH. Lit. and Phil. Tr. N. Y. Vol. 1, p. 411.
Le Johnnius œillé ou brulé, C. ocellata. CUV. et VAL. Hist. Poiss. Vol. 5, p. 134. pl. 180.

Characteristics. Cylindrical. One, two or more rounded blackish spots on the base of the tail. Length one to three feet.

Description. Body more cylindrical than in the other species; back less elevated. Snout obtuse and prominent. Scales oblique, and covering the head. Lateral line concurrent with the back, and continued to the end of the tail. A band of even teeth in both jaws; the anterior row in the upper jaw conic, distant. Five pores beneath the lower jaw. Preopercle distinctly denticulated; the opercle ending in two points.

The spinous portion of the dorsal fin in a groove; the first ray very small, and closely applied to the second, which is shorter than the third: this latter is longest. Soft portion three times the length of the first, with subequal rays. Anal fin with two spinous rays: the first very short; the second one-third less than the succeeding soft ray. Caudal fin nearly even, slightly excavated.

Color. Bluish above; lighter beneath. Head, cheeks and shoulders golden, with metallic reflections. Dorsal fin dusky green. Pectorals, ventrals and anal fin tinged with red. On each side of the tail, at the base of the caudal rays, is a blackish brown spot, often bordered with white. Occasionally two on one side, becoming confluent on the other. According to Dr. Mitchill, it resembles the mark left by a heated iron, which has given rise to the name of *Branded Drum.*

Length, 12·0 – 42·0 Depth, 5·0 – 8·0.
Fin rays, D. 10.1.26; P. 17; V. 1.5; A. 2.8; C. 17.

This beautiful fish, which appears but occasionally on our coast, is more common at the south. Lesueur states that it is common at New-Orleans, where it is seen from eight inches to three feet long; it is called there *Poisson rouge* or *Red-fish.* At Charleston, it is called *Bass, Sea Bass* and *Red Bass.* It is a highly esteemed fish.

THE MALASHEGANAY.

CORVINA RICHARDSONII.

PLATE XX. FIG. 55.

Le Corb de Richardson, C. richardsonii. CUV. et VAL. Hist. Poiss. Vol. 5, p. 100.
The Malashegané, Sciena (Corvina) id. RICHARDSON, Faun. Vol. 3, p. 64, pl. 77.

Characteristics. Greenish grey, with dusky bands over the back. Dorsal with a long membrane behind. Anal with a single robust spine. Length one to two feet.

Description. Form of the *C. oscula*, but with a more vertical profile, and the body more oval. Scales large and robust, and their relative size as in the species just alluded to. Under jaw somewhat longest, with four pores beneath. Mouth cleft as far back as the middle of the orbit. Eyes moderately large, more than two diameters from the end of the snout. Teeth numerous, minute, equal, but the outer row somewhat larger. Opercle ending in two lobes; preopercle minutely crenulated.

The first dorsal spine short and obscure; the fourth longest, from which they diminish to the ninth. The first ray of the soft portion of the dorsal spinous; the remainder subequal; the last ray connected by a broad scolloped membrane, two inches long, to the upper part of the tail. Pectoral fins pointed, its longest rays exceeding in length those of any other fin. Anal fin with a stout ray, deeply grooved behind.

Color. Grey, with dark transverse bands above. Sides silvery. Abdomen yellowish.

Length, 10·0 – 24·0. Depth, 4·0 – 8·0.
Fin rays, D. 9.1.18; P. 15; V. 1.5; A. 1.7; C. 17 $\frac{4}{4}$.

This species, which is common in Lake Huron, where it is highly prized as food, and is called *Sheepshead*, also occurs, as I am informed, in Lake Erie. A fish has been described to me at Buffalo and Barcelona, where it is called *Black Sheepshead*, which agrees well in its savory qualities, color and other characters, with the above species. Feeds on crayfish, etc.

(*EXTRA-LIMITAL.*)

C. grisea, White Perch of Ohio. (LES. Ac. Sc.) Dorsal long; scales rough; a slight frontal depression. D. 9.33; V. 1.5; P. 16; A. 2.8; C. 19 $\frac{4}{4}$. Length one to two feet. *Ohio River.*

THE SHARP-FINNED CORVINA.

CORVINA OXYPTERA.

PLATE XXX. FIG. 96. — (CABINET OF THE LYCEUM.)

Characteristics. Opercle obsoletely serrate, with two spines; preopercle denticulated. Pectoral fins long and pointed. Length eight inches.

Description. Body oblong, elliptical, compressed. Height to the total length as 1 to 3·5. Back arched, rounded, not gibbous. Scales large, orbicular, wider than long, finely ciliated on the free margins, with 7 – 10 radiating plaits in front, and festooned on the radical edge. The scales cover every part of the head and jaws, where they are smaller, and ascend high up on all the fins. Lateral line tubular, arising from the upper angle of the branchial aperture, and forming a very convex sweep towards the back, with which it is concurrent. Head convex, and forming with the outline beneath a regular oval. Snout obtusely pointed. Eyes large, prominent, 0·5 in diameter, and slightly more than their diameters apart. Nostrils anterior to the eyes, approximated; the posterior transversely oblong, largest; the anterior with a valvular margin. Opercle with a long triangular flat spine, not extending beyond the pointed membrane; beneath this, at a distance of 0·2, is another short triangular and smaller lancet-shaped spine. The edge of the opercle feels rough to the touch, but is without any visible serratures. Preopercle angular, with from eighty to ninety short acute spines, one rather longer at the angle; these become effaced on the anterior portion of the lower margin. Mouth moderate, protractile. In the upper jaw, the central part is a free interval. On each side of this free space is a small rounded patch, composed of minute supine teeth directed backward. Anterior to this patch is a tooth on each side, much larger than the others; the teeth on the sides of the jaw form a small and subequal series. Very minute teeth, reduced to mere asperities, on the vomer and palatines. Similar asperities on the tongue, but the tip is smooth. In the lower jaw are bands of minute recurved teeth, mixed with others of a larger size; these bands dilate as they approach each other in the middle of the jaw: in front, on each side, is a stout conical tooth directed forward. Branchial membrane with seven rays.

The dorsal fin compound, and composed of ten spines and nineteen articulated rays; the spinous portion highest; the first spine shortest, 0·4 in height; the second longer, and the third longer and 0·7 in height; the succeeding spines preserve this height. The spines are very robust, acute, and enveloped in a strong membrane, which is covered with scales nearly to the summit. The rays of the soft portion are slender, and gradually increase in size posteriorly, the tips of the last rays reaching nearly to the accessories of the caudal fin. Pectoral fin very long, lanceolate; its tip reaching a point opposite the fifth ray of the soft dorsal, or the third ray of the anal. It is composed of twenty rays, the eleventh and twelfth longest. Counting from above, the rays rapidly diminish beneath these rays. The length of the longest ray is 2·3; width of the base, 0·5; the scales on the base elongated. Ventral fins slightly posterior to the base of the pectorals, and composed of one robust spine and five branched

rays; the tips reach to within 0·5 of the vent. The anal fin contains three spinous and seven branched rays; the first spine is short, triangular and acute; the second longest, very robust and acute, and its length is 0·8 inches; the third shorter than the second: this fin ends opposite the tenth soft ray of the dorsal. Caudal furcate, with nineteen full rays and seven accessories on each side.

Color. Of this I can say nothing, as the specimen was in spirits. It appeared to have been of a light yellowish hue, spotted with white and silvery. Irides yellow.

Length, 8·0. Depth, 2·2.
Fin rays, D. 10.19; P. 20; V. 1.5; A. 3.7; C. 19 $\frac{7}{7}$.

The specimen which furnished the foregoing description, has existed for many years in the Cabinet of the Lyceum, and was obtained from the adjacent coast. Dr. Mitchill regarded it as allied, if not identical with his *Coryphena perciformis*, the *Palinurus* of this volume. It is apparent from the above description, that it cannot be allied even to that species, nor can it remain in the same family. We place it provisionally among the Corvinas, but are inclined to believe it to be the type of a new genus.

GENUS UMBRINA. *Cuvier.*

Two dorsal fins. A single cirrus or beard on the point of the lower jaw.

THE KING-FISH.

UMBRINA ALBURNUS.

PLATE VII. FIG. 20.

Bermuda Whiting. GARDEN, Corr. of Linneus, Vol. 1, p. 305.
Perca alburnus. LIN. 12 Ed. p. 482.
Alburnus americanus. CATESB. Car. 2, pl. 12.
Whiting. SCHŒPFF, Fishes of N. Y. Vol. 8, p. 162.
Johnius regalis. SCHN. Bl.* p. 75.
Centropomus alburnus. LACEPEDE.
Sciena nebulosa, King-fish. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 408, pl. 3, fig. 5.
L'Ombrine des Etats-Unis. CUV. et VAL. Hist. des Poiss. Vol. 5, p. 180.
U. nebulosa, the King-fish. STORER, Massachusetts Report, p. 35.

Characteristics. Dark grey, with silvery reflections; oblique dusky bars and bands over the back. Tail with a sinuous margin. Length twelve to eighteen inches.

Description. Body elongated, cylindrical, tapering. Scales rounded, ciliated. Lateral line concurrent with the back, and near it. Snout produced, prominent and blunt. Opercle with two strong flat spines; preopercle serrated behind. Branchial rays seven, the two upper and two lower obscure. On the snout, in the fold which receives the upper jaw, are four cuti-

* P. 15; V. 7; A. 12; C. 17; D. 9.9.30. Hab. in Am. Septentrionali in provinciam New-York. *King* vel *White-fish* dictus.

cular appendages, broad and truncated at their extremities, with corresponding fossæ (see figure). A single cirrus on the point of the lower jaw, with four pores or fossæ. Teeth in the upper jaw, long, acute, distant; in the lower, short, even and crowded.

First dorsal fin triangular, with its third ray longest and filamentous. The second dorsal fin separated from the first by a brief interval; its first ray short and spinous, the remainder subequal. Pectoral fins broad and pointed, extending to the second dorsal fin, with a spurious triangular plate covered by scales. A smaller one under the ventrals, which are broad and rounded. Anal fin short, commencing under the eighth ray of the second dorsal, and composed of one spinous and eight branched rays. The caudal fin excavated above, rounded beneath, its upper tip pointed, and probably, in young individuals, its lower; but in several hundreds which I have examined, this portion is rounded.

Color. Back and sides dark steel-grey, and, in certain lights, lustrous, silvery and reddish. Abdomen bluish-white. In its dying struggles, the whole fish displays frequent changes of beautiful colors. Irides yellow. Margin of the first dorsal deep brown. Caudal and pectorals olive brown. Ventrals and anal yellowish. On the upper parts of the body are oblique broad dark stripes, which become interrupted towards the tail. An irregular horizontal dark stripe is often seen, commencing at the tips of the pectorals, and running back through the tail. In dying, these stripes change from pale ash to deep black.

Length, 12·0. Depth, 2·5.

Radial formula, Br. 7; D. 10.1.25; V. 1.5; A. 1.8; C. 17 $\frac{3}{3}$.

The stomach is a simple sac, filled with marine plants and the remains of crustaceous animals; the pylorus with nine cæcal appendages. Twenty-five vertebræ. No air-bladder.

This fish, which is not very abundant, or at least is not captured in any very considerable quantities, appears in our waters in July and August. It readily commands a high price, on account of the esteem in which it is held as an article of food. Hence it derived its name of *King-fish* from the early English colonists, who were accustomed to designate every kind of excellence by this epithet. Schœpff, in the work above cited, says, "the branchial rays three "to five." Cuvier, in remarking upon this, says, "Schœpff, qui en trouvait cinq, mais qui "n'osait contredire Linneus, prétend-il que le nombre est indéterminé de trois à cinq." The figure given by Catesby is execrable, and without the aid of Cuvier, would long have remained an icthyological puzzle.

It is exceedingly abundant on the coast of Carolina and Florida, where it is known as the *Whiting*. The coast of New-York may be considered as its ordinary northern range, but a few wander north of Cape Cod, as far as the harbor of Boston.

EXTRA-LIMITAL.

U. coroides. (Cuv. et Val. Vol. 5, p. 187; and pl. 72, fig. 231 of this volume.) Nine broad dusky vertical bands; anal fin with two spines; lobes in front of the mouth rounded. Length 8 inches. *South Carolina.*

I insert this on the authority of a figure given by Dr. Holbrook, among his drawings of the fishes of Carolina.

GENUS POGONIAS. *Lacépède, Cuvier.*

Two dorsals as in the preceding, or one deeply divided. A series of cirri or beards beneath the lower jaw.

Obs. The fishes of this genus are remarkable for their size, and the noise which they produce under water. Scarcely any two observers agree respecting the nature of this noise. The fishermen compare it, when produced by large scholes, and heard in a still night, to the distant sound of drums, and hence the popular name. Schœpff describes it as a hollow rumbling sound, and Mitchill speaks of it as a grunting (p. 405), and at p. 411 as a drumming noise. When freshly taken from the water, it sounds as if two stones were rubbed together. The cause of this noise is yet unexplained. Cuvier seems inclined to believe it connected in some way with the large and muscular air-bladder, although he admits that it has no external outlet. I am induced to suspect it to be occasioned by the strong compression of the expanded pharyngeal teeth upon each other.

THE BIG DRUM.

POGONIAS CHROMIS.

Labrus chromis. Linneus.
Sciena id. Lacepede et Schneider.
Labrus id. Drum-fish. Schœpff, Vol. 8, p. 158.
Mugil gigas. Mitchill, Report in part on Fishes of N. Y. p. 16.
Sciena fusca, Black Drum. Id. Lit. and Phil. Soc. Vol. 1, p. 409.
S. gigas, Red Drum. Id. Ib. p. 412.
Le Grand Pogonias, P. chromis. Cuv. et Val. Hist. Poiss. Vol. 5, p. 206.

Characteristics. Large. Brownish bronze, varying from blackish to reddish. Length two to four feet.

Description. Body compressed and deep. Scales large and stout, oblique, with slight striæ. Mouth protractile. Two flattened obtuse points on the opercle. Teeth on the jaws in a band, numerous, crowded, blunt and subequal. Pharyngeals with large paved teeth. Tongue smooth. Nostrils double; the anterior circular; the posterior subovate, and furnished with a membrane. A row of slender vermicular cirri on each side, and ten or twelve irregularly disposed about the chin. Near the chin, among the cirri, are three large pores. Branchial rays seven.

The first dorsal fin with ten stout flattened rays; the first very short, and scarcely apparent above the skin; second and third longest, thence gradually diminishing to the last: it is capable of being concealed in a furrow. The second dorsal fin rises near the first (according to Cuvier, continuous with it); its first ray short and spinous, the other soft and subequal; with the rudiment of a furrow for its reception. Pectorals large, pointed; the tips of the ventrals not extending beyond the points of the pectorals. Anal fin, with its first spinous ray, exceed-

ingly short; the second long, flat and stout; the remainder seven branched, the last subdivided. Caudal even, with scales extending over its base, and more particularly along its central rays. Air-bladder very large and oval, and with exceedingly thick coats; it has on its sides two pointed lobes, directed backward, and which are festooned on their margins. A large red gland within, and several distinct lacunæ. Spleen very long; cæcal appendages six to eight. Vertebræ twenty-four.

Color. Brownish bronze; rather lighter beneath, with a blackish spot behind the pectorals. Scales silvery on their external edges. There are two strongly marked varieties: one dark brown, the *Black Drum* of the fishermen; and the other the *Red Drum*, as these colors predominate.

Length, 24·0 – 48·0.
Fin rays, D. 9.1.22; P. 18; V. 6; A. 2.7; C. 17 $\frac{3}{3}$.

This is a large and deep fish; its length being usually about three feet, with a depth of from fifteen to eighteen inches. One of this size weighs about twenty-five pounds. I have heard of their weighing more than eighty pounds. They are gregarious, and are frequently taken in great numbers by the seine, during the summer, along the bays and inlets of Long Island. Their present geographical range appears to extend from Florida to New-York. I do not find them mentioned by Dr. Storer as occurring on the coast of Massachusetts. They are a coarse food, but the young are considered as a great delicacy.

THE BANDED DRUM.

POGONIAS FASCIATUS.

PLATE XIV. FIG. 40.

Pogonias fasciatus. LACEPEDE, Hist. Nat. des Poissons.
Mugil grunniens. MITCHILL, Report in part, &c. p. 16.
Labrus grunniens, Grunts. ID. Lit. and Phil. Soc. N. Y. Vol. 1, p. 405, pl. 3, fig. 3.
Le Pogonias à bandes. CUV. et VAL. Hist. des Poiss. Vol. 5, p. 210, pl. 118.

Characteristics. Dusky, with four or five blackish vertical bands extending down the sides. Length seven to ten inches.

Description. Body compressed; more along the back than beneath, and thus giving a triquetral figure to a transverse section of the body. Head sloping from the first dorsal to a short distance before the eyes, then more suddenly descending. Scales over the whole body and the head, except the anterior part of the snout and the lower jaw. They rise up along the base of the second dorsal, forming a sort of sheath: on the head they are small, wedge-shaped, ciliate; on the body, large and orbicular; the exposed surface small and ciliate, the concealed portion with radiating furrows and minute concentric striæ. Lateral line concurrent with the back. Eyes large, with a prominent superciliary ridge. Nostrils double; the posterior transversely oval. On the outer sides of the jaws, midway between the tip of the

snout and the angle of the jaw, is a small cirrus on each side, and anterior to this the opening of a mucous duct; from this extend along the inner sides of the jaw, 10 – 12 distant cirri or beards, of which the posterior are longest. Teeth in both jaws, fine and card-like. The tongue smooth. The pharynx is paved with teeth, flattened on their crowns.

The first dorsal fin triangular, with ten spinous rays; the first very short; the second shorter than the third, which is longest; thence gradually diminishing backwards. The second dorsal continuous with the first, nearly as high, with its first ray short and spinous. Pectorals long and pointed, reaching as far back as the third ray of the posterior dorsal. Ventrals distant, rounded, with one short spinous and five branched rays. Anal fin higher than long; the first ray short, spinous, and very acute; the second longer, triangular, and stoutly spinous; all the remainder branched, the third and fourth longer than the second spinous ray.

According to Cuvier, the liver is of an ordinary size, sending off two delicate flattened lobes, of which the right one is narrowest. To this lobe is attached the long and cylindrical gall-bladder. The choledochus ascends into the space between the lobes of the liver, and in its course receives a few cystic vessels; it afterwards becomes free, and empties into the duodenum behind the cæcal appendages, of which there are six, half as long as the stomach. The air-bladder strongly attached to the vertebræ in the upper third of its length, with the same processes noted in the other species. Kidneys large, thick, united. The ureters are of a moderate length, and end behind the rectum, quite close to it, but with no vestige of a urinary bladder.

Color. Body of a dusky hue, with silvery and bronze intermixed; after death, the general hue is chocolate-brown, the dusky bands becoming more intensely dark. Summit of the head dark brown, resembling the vestige of a band. Four dusky bands over the body; one anterior to the dorsal, and descending to the pectorals; the second crossing the posterior portion of the first dorsal, and the last two crossing the second dorsal. Pectoral fin faint yellowish; the others dark brown, somewhat lighter at their bases.

Length, 9·5. Depth, 3·5.
Fin rays, D. 10.1.22; P. 20; V. 1.5; A. 2.5; C. 15 $\frac{3}{3}$.

This fish appears in our waters from the south in October and November, and sometimes as early as September. It has been supposed that this species is the young of the preceding; but I have seen them in September, six inches long, with all the characters of the adult. It has various popular names, such as *Grunter, Young Drum, Grunts,* and *Young Sheepshead.* From Dr. Holbrook's figures, I infer that this species occurs on the coast of Carolina. It does not appear to extend farther north than the sea-coast of New-York.

GENUS MICROPOGON.

The prominent snout and general form of Umbrina, *with a few scarcely apparent cirri or barbules under the lower jaw. Preopercle dentated, with two spines at the angle. Opercle with two flat points. Five pores under the chin. Dorsal fin deeply divided.*

THE BANDED CORVINO.

MICROPOGON COSTATUS.

PLATE LXXII. FIG. 230.

Bodianus costatus, Middle Grunts? MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 417.
La Micropogon rayé. CUV. et VAL. HIST. des Poiss. Vol. 5, p. 215, pl. 119.
Umbrina fournieri. DESMAREST, Dict. Classique d'Hist. Naturelle.

Characteristics. Silvery, with about twenty narrow greyish bands over the back and along the sides, directed obliquely forwards. Length ten to fifteen inches.

Description. Body elongated. First dorsal triangular, with feebly spinous rays; the second long, with subequal rays. Anal long as in *Pogonias;* the second spinous ray half the length of the succeeding. Caudal slightly rounded. Branchial rays seven.

Color. Silvery, with a lustrous black spot on the opercle. Occasionally two or three longitudinal bands on the dorsals, formed by series of brownish spots. More than twenty bands on the back, descending obliquely forwards on the sides.

Length, 10·0 – 15·0.
Fin rays, D. 10.1.28 or 29; P. 17; V. 1.5; A. 2.8; C. 17.

I have very little doubt but that this species was intended to be described by Dr. Mitchill in his valuable paper on the Fishes of New-York, under the name cited above. This is apparent by the following extracts from his description: "Middle plate of the tripartite gill-"cover both serrated and aculeated. Head scaly. Neither of the two dorsal fins properly "spinous. Five holes under the chin, among half a dozen very delicate cirri. Has the "ragged cirrhous appendage to the upper lip which the king-fish possesses, and also the two "orifices near them. Has indeed very much the habit of the king-fish. Two first anal rays "spinous, one short, the other long. Color pale brown on the back, with silvery sides and "white belly variegated with hues of yellowish blue and green; a dozen or more narrow "faint clouds slant down the sides, looking almost like ribs; a greenish spot in the middle of "the posterior gill plate; a dark spot at the origin of the pectoral fin. D. 10 – 29; P. 17; "V. 6; A. 10; C. 17."

I have never seen this species, which is doubtless rare on the coast; nor do I find it among the figures of Carolina fishes communicated to me by my friend Dr. Holbrook. It occurs from the River La Plata to New-York, from which latter place specimens were sent to Cuvier by Milbert. Its flesh is coarse, and little esteemed.

(*EXTRA-LIMITAL.*)

M. undulatus. (Cuv. et Val. Vol. 5, p. 219. Catesby, Vol. 2, pl. 3, fig. 1.) Obscure brownish spots on the back; no lines nor bands. Length thirteen inches. *New Orleans, Charleston.* According to Schœpff, ascends the Chesapeake, and occasionally Delaware bay.

GENUS HEMULON. *Cuvier.*

A single dorsal emarginate fin. Seven branchial rays. An oval cavity and two small pores under the chin. Ventral fins scaly. Preopercle denticulated.

THE SPECKLED RED-MOUTH.

HEMULON FULVO-MACULATUM.

PLATE VII. FIG. 21. — (CABINET OF THE LYCEUM.)

Labrus fulvo-maculatus, Speckled Grunts. Mitch. Lit. and Phil. Soc. Vol. 1, p. 406.

Characteristics. Small; with yellowish horizontal stripes below the lateral line, and oblique stripes above it. Length five inches.

Description. Body compressed; back rounded. Height one-third of its total length. Scales moderate, subquadrate, truncated in front with radiating plaits; free portion rounded, reticulate near the margin, which is minutely ciliate; form a sheath on each side of the dorsal and anal fins. A scaly fold under the base of the pectorals. Eyes 0·3 in diameter. Anterior nostril largest, with a raised margin. Teeth minute, conic, acute, bent at the tips, and disposed in cards in both jaws; the anterior series slightly longest. Minute teeth on the pharyngeals. Tongue thin and free.

Dorsal fin with twelve spinous and fifteen slightly branched rays; the first slightly shortest, the three following gradually longer; the soft portion rather higher than the other. The pectoral fins long and pointed, composed of eighteen rays; the first rudimentary; the sixth longest, reaching to the tenth spinous dorsal ray. Ventral fins just behind the base of the pectorals, and without a scaly fold. The first spine of the anal fin very short, the second and third longer and subequal. Caudal fin of seventeen rays, and covered with minute scales; crescent-shaped; the upper lobe longest.

Color. I am only acquainted with this through a cabinet specimen, the identical one from which Mitchill drew up his description. As this was recent, I annex his account of the disposition of the colors: Bluish silvery. Above the lateral line, rows of yellow speckled stripes, almost parallel with each other, which run obliquely towards the dorsal fin; below it, similar rows extended nearly in a horizontal direction from the branchial aperture to the tail. Belly and chin more pale and whitish than the back. Cheeks with the ochreous streaks which dis-

tinguish the back and sides. Eyes pale, with a dash of dark across them. Pectorals faintly yellow, the rest pale.

Length, 6·0. Depth, 2·0.
Fin rays, 12.15; P. 18; V. 1.5; A. 3.12; C. 17.

This is a rare fish, but occasionally appearing, as I am informed, in our harbor in considerable numbers. It is, like its congeners, a southern fish, our coast being probably the extreme northern limits of its range. It is a very savory food. It is somewhat allied to the *H. formosum*, but does not agree with any of the twelve species enumerated by Cuvier and Valenciennes.

THE YELLOW-FINNED RED-MOUTH.

HEMULON CHRYSOPTERON.

PLATE VII. FIG. 22.

Margate Fish. CATESBY, Car. Vol. 2, pl. 2, fig. 1.
Perca chrysoptera. LIN. 12 Ed. p. 485.
La Gorette à nageoires fauves. CUV. et VAL. Hist. Poiss. Vol. 5, p. 240.

Characteristics. Head and body uniform color, with darkish stripes on the head. Dorsal with thirteen spinous, and anal with nine soft rays. Length one foot.

Description. In its general shape and size, it resembles the Big Porgee (*Pagrus argyrops*); but the facial profile is longer and more sloping, producing an elongated snout. Scales as in the preceding species. Lateral line distinct (but caricatured in the plate). Preopercle serrate on its ascending and lower margin; the angle rounded. The two flat points on the opercle, which are sometimes included in the generic character, almost obsolete. Gape enormous. Lips large and fleshy. A round cavity in the symphisis of the lower jaw; and anterior to it, two small pores. On the sides of the lower jaw, a single series of sharp distant equal teeth, card-like in front; in the upper jaw, in a single series, with a patch in front. Pharynx with paved teeth. Tongue distinct, rounded.

The dorsal fin contained in a scaly sheath; the fourth and fifth spines longest; the last spine is longer than the one preceding; the soft part not as high as the spinous part. Pectoral fins reach the antepenultimate spinous dorsal ray. A slight accessory plate beneath the ventrals. Caudal forked.

Color, of the head and body silvery, bronzed darker on the back, with occasionally obscure dark stripes across it. The pectorals, dorsal and caudal fins of a brown horn-color; the anal and ventral fins tinged with yellow and orange. Base of the lower jaw within and without of a beautiful vermilion. Tongue and fauces bright red.

Length, 11·0 – 12·0. Depth, 3·5 – 4·0.
Fin rays, D. 12.15; P. 17; V. 1.5; A. 3.9; C. 15 $\frac{2}{2}$.

This remarkable fish is but an occasional visitor to our shores. They are, however, often exposed for sale in our markets during the months of August and September, and are highly prized as food. Milbert sent them, many years since, from New-York to Cuvier, who supposes them to be the *chrysoptera* of Linneus. The description of Linneus scarcely accords with my specimens; at least, I have never noticed the straight lateral line, nor the fuscous spots on the fins.

THE SQUIRREL-FISH.

HEMULON FORMOSUM.

PLATE XX. FIG. 59.

P. marina capite striato, Grunt. CATESBY, Car. Vol. 2, pl. 6, fig. 1.
Perca formosa. LIN. 12 Ed, p. 488.
L. Ecureuil. BON. Tab. Method. p. 135, pl. 57, fig. 221.
La Belle Gorette. CUV. et VAL. Hist. des Poiss. Vol. 5, p. 230.

Characteristics. Bluish stripes on the cheeks. The second anal spine very robust. Length twelve inches.

Description. Body compressed; back arched; snout produced. Its greatest depth to its length as one to four nearly. Scales large, rounded and ciliate on the free edges, reticulated on the exposed surface, with 12 – 16 radiating parts in front. The scales are largest on the sides of the body; smaller beneath and on the head; smaller on the base of the pectoral, dorsal and caudal, extending to the very tips of the three latter fins. In an oblique series from the dorsal fin, there are ten scales above and twenty-six beneath the lateral line, which is concurrent with the back. Eyes 1·6 in diameter, and 1·1 apart. Mouth large; the maxillary terminating under the centre of the eye, and covered along its whole extent by the lower margin of the suborbital. Preopercle with a rounded angle; its posterior margin vertical, directed backwards, serrated. Under a lens this appears to consist of numerous equal and equidistant conical spines, becoming distant and smaller at the angle, effaced beneath. Opercle bluntly pointed behind. Teeth in the jaws numerous, minute, equal, forming a large patch in front, and reduced to a single series of distant teeth on the sides. In the upper jaw, the outer row is formed of larger, conic, pointed and recurved teeth. Tongue free, smooth, truncate in front.

Dorsal fin, with its twelve spinous rays, exceedingly robust and acute, and received into a sheath; the first, second and third gradually longer; the fourth and fifth longest, subequal: every alternate ray less robust. The soft portion contains fifteen rays, as nearly as they can be counted through the scaly membrane. Pectoral fins long and pointed, with one spinous and sixteen branched rays; its tips reach to the soft portion of the dorsal fin, and it has an axillary plate composed of elongated scales. Ventrals with a robust spiny ray, and five branched rays. Anal fin with three spinous and nine flat branched rays, covered to their tips with scales; the first is short and triangular; the second enormously stout, longest, and lon-

gitudinally striate on the sides; the third slender, acute, not as long as the second. Caudal forked, with the tips rounded.

Color. The specimen we examined was in spirits; we can, therefore, only state that its head appeared to be darker than the body, with numerous broad oblique rays from the eyes to the snout, and across the opercles. According to Cuvier, there are ten to twelve steel-colored rays, bordered with brown, on a ground more or less gilded, and not passing the branchial aperture. Remainder of the body entirely golden grey, without lines, and unvaried except by the dead coloring on the free margins of each scale.

Length, 11·0. Depth, 3·8. Width behind the branchial aperture, 1·5.
Fin rays, D. 12.15; P. 1.16; V. 1.5; A. 3.9; C. 17 $\frac{2}{2}$.

This appears to be but a casual visitor from the south, as far as Brazil. The specimen from which I drew up the preceding description, was caught in the harbor of New-York in July. It prefers rocky bottoms, and is said to afford good eating.

(*EXTRA-LIMITAL.*)

H. arcuatum. (Cuv. et Val. Vol. 9, p. 481.) Body elevated; teeth very large. Dark blackish green, with a brilliant gilded crescent on each scale. D. 12.17; A. 3.9. Length eleven inches. *South-Carolina.*

GENUS PRISTIPOMA.

A single dorsal. Preopercle denticulated. A cavity and two pores under the chin. Dorsal and anal fins not scaly. Opercle with its points and angles blunted or effaced. Outer row of teeth generally more robust.

THE BANDED PRISTIPOMA.

PRISTIPOMA FASCIATUM.

Le Pristipome à bandes. Cuv. et Val. Hist. des Poiss. Vol. 5, p. 285.

Characteristics. Olive brown; with thirteen soft anal rays, of which the third is longer than the second. Length eight inches.

Description. Depth to its length as one to three and a quarter.

Color. Grey brown, inclining to olive, with eight to nine cloudy blackish bands alternately narrow and wide. Dorsal with a white band along its entire base. Air-bladder ending in three points forward.

Fin rays, D. 12.16; P. 16; V. 3.13; C. 17.

I know nothing of this fish, except that Cuvier received it from New-York.

(*EXTRA-LIMITAL.*)

P. rubrum. (Cuv. et Val. Vol. 5, p. 283.) Red. The third spine of the anal not longer than the second. Allied in form to the preceding. D. 12.14; A. 3.9.

GENUS LOBOTES. *Cuvier.*

Branchial rays six. Snout short. Dorsal and anal fins elongated behind. Preopercle with strong dentations. Dorsal spines in a sheath. Four or five small pores on the chin.

Obs. In addition to the character assigned above, *Lobotes* is farther distinguished by a prominent lower jaw, and a slightly concave profile; the dorsal and anal so much lengthened out behind as to cause the body to appear as if ending in three lobes. It is a small group, containing as yet but four species.

THE BLACK TRIPLE-TAIL.

LOBOTES SURINAMENSIS.

PLATE XVIII. FIG. 49.

Holocentrus surinamensis. Bloch, pl. 243.
Bodianus triurus, Triple-tailed Perch. Mitch. Lit. and Phil. Soc. Vol. 1, p. 418, pl. 3, fig. 10.
Le Lobotes de Surinam. Cuv. et Val. Hist. des Poiss. Vol. 5, p. 319.

Characteristics. Blackish mixed with ferruginous. A foot or more in length.

Description. Form elliptical, deepest opposite the first dorsal ray. Scales moderately large, adherent, forty-five in a longitudinal row and thirty in a vertical line; their edges ciliate, and small ones are observed on the bases of the vertical fins. Lateral line tubular, concurrent with the back. Nape rather prominent, somewhat concave behind the eyes. Head covered with scales, except on the snout and the end of the jaws. Lower jaw somewhat projecting. Velvet-like teeth, with a row rather larger and conical in front of the jaws. Opercle with ten to twelve sharp denticulations; the two points on the angle of the opercle only apparent to the touch. Surscapulary bone small, with minute denticulations. Ten to twelve denticulations on the humeral bone, above the pectorals.

Dorsal fin long, with twelve subequal spines and fifteen soft rays; the longest rays of the soft portion reach nearly to the middle of the caudal fin. Pectoral fins small, oblong. Ventrals beneath them, longer, and with a very robust spine. Anal fin with three spinous and eleven soft rays; coterminal with the dorsal, and with equally long rays. Caudal rounded.

Color. Back and sides rusty black; abdomen dingy rufous, variegated with black and yellow specks. A dull yellow distinguished behind the eyes, above the gill-covers, along the base of the dorsal fin, commencement of the lateral line, and under the pectoral fins. Dorsal, anal and ventral fins slightly tinctured with yellowish.

Length, 13·0. Depth, 5·0.
Fin rays, D. 12.15; P. 17; V. 1.5; A. 3.11; C. 17.

This is a rare species in our waters. According to Dr. Mitchill, they are sometimes found weighing four or five pounds. It is sometimes called *Black Grunts*. Among the drawings of Dr. Holbrook is the figure of a *Lobotes*, which appears to differ from the above in the following particulars: It is of a general inky blackness, with a yellow suffusion along the back, and at the base of the caudal and anal fins; the first dorsal ray is half the length of the second, and the tenth nearly equal to the first. It may possibly prove to be a new species.

The Black Triple-tail occurs from the coast of Brazil, and through the tropical seas, to New-York, which forms the limit of its most northerly range.

FAMILY V. SPARIDÆ.

No spines nor denticulations on the opercular bones. No teeth in the palate. Mouth not protractile. Scales large.

Obs. This family was founded on many of the characters assigned by Artedi to his genus *Sparus*. It is divided into thirteen genera, comprising about one hundred and seventy species. On the coast of New-York, we have as yet but three representatives of this family.

GENUS SARGUS. *Klein, Cuvier.*

Cheeks scaly. With cutting incisors. Large rounded teeth; molars in several rows. Branchial rays five.

THE SHEEPSHEAD.

Sargus ovis.

PLATE VIII. FIG. 23.

Sparus, Sheepshead at New-York. Schœpff, Description of N. A. Fishes, Vol. 8, p. 152.
Sparus ovis, Sheepshead. Mitch. Tr. Lit. and Phil. Soc. Vol. 1, p. 392, pl. 2, fig. 14.
Le Sargue, Tête de Mouton. Cuv. et Val. Hist. des Poiss. Vol. 6, p. 53.
S. ovis, the Sheepshead. Storer, Massachusetts Report, p. 36.

Characteristics. Large; banded. Form elliptical. Tail abruptly diminished from the body. Anal black, with ten soft rays. Length one to three feet.

Description. Body much compressed. Head sloping, and enlarged by the projection of the orbits; the curves formed by the facial line, and that of the chin and throat, equal; breast anterior to the ventrals, flattened. Scales adherent; on the sides large, subquadrate, with radiating striæ, and with more than two-thirds of their surface concealed. On the opercles, the scales are moderate; on the abdomen, tail, and base of the fins, small. A band of small

scales from the upper part of the branchial aperture, crosses over the nape, and meets one from the opposite side, interrupting the general plan of the scales; this band is bordered behind with a row of orbicular abnormal scales. Lateral line concurrent with the back, and runs through the tail somewhat above the medial line. Nostrils double; the anterior circular; the posterior, oblique slits. Preopercle broadly rounded beneath. Opercle slightly emarginate. Lower jaw shortest. Lips thick and fleshy. Within a fold of the lower lip, on each side, there is a short tubercle, which is only apparent when the fold is separated. In front of each jaw there are from six to eight incisors or cutting teeth, quadrilateral, somewhat smaller towards their roots. Inside of these, above and beneath, are numerous rounded flattened paved teeth, forming two or three series; those in front, and which are on the outer series on the sides, are smaller and more acutely conic than those behind (see figure). Tongue large and smooth. Pharyngeals with numerous teeth.

Dorsal fin compound, arising five inches from the end of the nose; the first twelve are stoutly spinous, flattened, with acute tips, and resembling sword-blades; they are situated in a deep fissure, and their flattened structure enables them to lie along side of each other, and to be entirely concealed; the first two are very short; the second longer than the first; the fifth and sixth subequal, longest. The posterior portion of this fin rounded, of eleven or twelve branched rays, all longer than the last spinous ray. The base of this portion of the dorsal fin is covered with scales, forming on its anterior portion a sheath or furrow, which becomes effaced behind. Pectoral fins very long and pointed, reaching to the third anal ray; the first and second short and simple. Ventral fin stout, of one spinous and five branched rays. An accessory plate or scale on the upper and inner side of the base. The greater part of the anal fin capable of being received and concealed in a furrow, and is composed of three broad and stout spines and ten branched rays, with scales high up on the base. Caudal fin forked, with its base covered by small scales.

Vent, a simple fissure equidistant between the pectorals and caudal. Parietes of the abdomen lined with a black pigment. Gall-bladder cylindrical, tubular, very long. Intestines with four large convolutions, and smaller ones near its termination. Stomach large, with six cæcal appendages. Several which I examined were found filled with the soft clam, *Mya arenaria*. Spleen fusiform, and of dark chocolate-brown color. Liver moderate; the right lobe smallest. Air-bladder large, closely attached to the upper part of the abdominal cavity, with very thick parietes, and a foramen in its posterior portion, communicating by a tubular passage with the intestine at or near the vent. Branchial rays five.

Color. Dull silvery on the sides, with brassy tints on the back, and with five transverse slight arcuated dark bands over the body and tail, uniting with similar bands on the other side; they become fainter towards and on the tail. Irides deep umber brown; pupil black, surrounded by a narrow brilliant golden ring. The dorsal and anal fins, upper part of the pectorals, and base of the ventrals, deep brown or black; an obscure black spot behind the shoulders, which becomes obsolete in larger fish. Upper part of the head and forehead black, with greenish and golden lustrous tints. Smutty patches, of irregular forms, under the chin.

Sides of the dorsal and anal spines with greenish metallic tints. Cheeks lustrous. Anal fin dark brown or black. Pectorals light yellowish.

Length, 14·0. Depth, 5·5. Weight, 2½ lbs.
Fin rays, D. 12.11; P. 15; V. 1.5; A. 3.10; C. 17 ⅔.

This large fish, which is also well known for its exquisite flesh, appears to have been neglected by the earlier naturalists. Schœpff, who appears to have been its first describer, says, "Common and well known as this fish is in America, it has hitherto been undescribed. "In its distinct and regular transverse bands, it has very marked characteristics, which, by "their numbers and situation, distinguish it from the *Sparus virginicus*, L."

The *Sheepshead*, so called probably more from the appearance of its mouth and teeth, than from "the profile of its head, and its curved nose and forehead," breeds along the southern coast, and appears on our shores in June. They enter the shallow bays on Long Island, where they are caught by the seine occasionally in great numbers. They are a wary, timid fish; and to take them by the hook, requires much dexterity. If the season is mild, they are found here as late as the middle of October, but more usually they disappear in September. The sheepshead holds the same rank with American gastronomes, that the turbot holds in Europe. I have frequently eaten of both, under equally favorable conditions, that is to say, within an hour after having been taken from the water, and can assert that the sheepshead is the more delicate and savory fish. The turbot, I may here state, (although I have heard the contrary frequently asserted,) does not occur on the shores of America. Dr. Mitchill supposes that the sheepshead departs from our shores to the unknown depths of the ocean; it is more probable that they return to warmer latitudes along the coast. They occasionally weigh from twelve to fifteen pounds, but are then not as valuable as those of a smaller size.

Its geographic range extends from the Mississippi to the coast of New-York. It occasionally wanders as far as the coast of Massachusetts, but has not been seen north of Cape Cod.

THE SAND PORGEE.

SARGUS ARENOSUS.

PLATE XXII. FIG. 67.—(STATE COLLECTION.)

Characteristics. Small. Banded as in the preceding. A short spine directed forwards in front of the dorsal fin. Length 6 inches.

Description. Body compressed, with the general form of the *P. argyrops*. Scales subovate, lobate behind, and minutely serrate; the concealed margin festooned with radiating striæ, distributed over the opercles and high upon the fins, forming a sheath for the dorsal and an imperfect one for the anal fin. Lateral line distinct, and concurrent with the back. Eyes large, near the facial line. The posterior nostrils oval, oblique, near the orbits; the anterior round. Margin of the opercle slightly angular; preopercular margin very smooth.

Mouth moderate, protractile, with a series of six flat chisel-shaped teeth in front of the upper jaw, with their tips somewhat enlarged, and a row of eight similar shaped teeth in the lower. Behind these, in both jaws, two or three series of small rounded molar-like teeth, which increase in size on the sides of the jaws. Groups of acute curved teeth in the pharynx. A short recumbent spine in front of the dorsal fin. Branchial rays five.

The dorsal fin commences anterior to the base of the pectorals, with its twelve first erect rays spinous; the first short, second and third longest, the remainder subequal; the soft portion about the height of the spinous part. Pectorals very long and slender, reaching to the tenth spinous ray of the dorsal. Ventrals stout, long and narrow, extending beyond the vent, with a long ensiform scale beneath; its first ray spinous. Anal fin terminating opposite to the end of the dorsal, on a sort of production of the body; it is composed of equal rays, and has three spinous rays in front. Caudal deeply forked.

Color. Sides silvery, becoming dusky above, with five or six dusky bars often obsolete, and entirely disappearing in cabinet specimens. Upper part of the head deep purplish brown, separated distinctly from the general color of the body. Dorsal fins horn-color; its last rays with a yellowish tinge. A purplish black spot just above the base of the pectorals. Pectorals and caudals faint yellow, the latter margined with dusky. Anal margined with faint yellow on the tips of the simple rays. Irides golden, mottled with brownish, turning to silvery. White after death, when many yellow lines, not before visible, make their appearance over the whole body.

Length, 6·0. Depth, 3·5.
Fin rays, D. 1.12.11; P. 16; V. 1.5; A. 3.12; C. 20 $\frac{4}{4}$.

This species is allied to the *S. rhomboides* of Cuvier and Valenciennes, but is at once distinguished by the want of bilobate teeth, and the recumbent spine before the dorsal fin. It is more closely allied to the *Chrysophris aculeatus*, to be hereafter described.

This small species is sometimes caught in seines on the south side of Long-Island, in the months of August and July. It is considered a palatable food. Its name of *Sand Porgee*, among fishermen, is derived from its being most frequently found on sandy bottoms.

THE RHOMBOIDAL PORGEE.

SARGUS RHOMBOIDES.

PLATE LXXI. FIG. 228.

Sparus rhomboides. LIN. Syst. Nat. 12 Ed. p. 170.
S. id. Salt-water Bream. SCHŒPFF, Desc. of North Am. Fishes, l. c. Vol. 8, p. 151.
Le Sargue rhomboïde, S. rhomboides. CUV. et VAL. Hist. des Poiss. Vol. 6. p. 68, pl. 143.

Characteristics. Banded. Cutting teeth, eight above and eight below, notched on their summits. Length three to five inches.

Description. Snout somewhat elongated. Second anal spine very robust. Teeth small, with eight incisors above, and the same number beneath; but two rows of molars.

Color, from a cabinet specimen. Silvery, with twenty-four or five gilded longitudinal lines; four or five brownish, more or less evident in certain lights, descend from the back along the sides. A blackish spot on the lateral line, behind the humeral bone. Dorsal greyish; anal yellow, bordered with violet; caudal yellowish olive. Pectorals and ventrals appear to have been of a brighter yellow than the other fins.

Length, 3·0 – 5·0.
Fin rays, D. 12.11; P. 17; V. 1.5; A. 3.10; C. 17.

Such is the succinct account given by Cuvier and Valenciennes of a species which they presume must be common on the coast of New-York, by the great numbers sent to them from that place by M. Milbert. We have seen, in the preceding article, that although it bears a general resemblance to the *Sand Porgee*, yet it cannot be generically that species. It occurs along the southern coast as far as the Mississippi. It may possibly be a migratory species, whose range within some years past has been restricted. We cannot coincide with the above cited authors in supposing this to be the *Poki* or *Porgee* at New-York of Schœpff (p. 153). His account is very imperfect, but we gather from it that his Porgee has no spots nor stripes; moreover, in another place (p. 151), he cites the true *Sparus rhomboides* of Linneus. At p. 154, he describes a *Sparus* from Rhode Island, which resembles the *Sargus* of Cuvier in its banded body; but it has seventeen spinous rays to its dorsal, and has an undivided tail.

GENUS CHRYSOPHRIS. *Cuvier.*

Four to six conical teeth in front of each jaw. The broad oval molar teeth in three rows. Branchial rays six.

THE ACULEATED GILT-HEAD.

CHRYSOPHRIS ACULEATA.

PLATE LXXI. FIG. 229.

La Daurade aiguillonée, C. aculeata. CUV. et VAL. Hist. Poiss. Vol. 6, p. 137.

Characteristics. Large. Body elongated. Without bands. A recumbent spine before the dorsal. Length 12 – 22 inches.

Description. Body more elongated than in the other species of this genus. A stout and short recumbent spine before the dorsal. Teeth small, in three series in the upper jaw; the middle smaller than the internal row.

Dorsal fin low. Pectorals long. Scales moderate; those of the preopercle extended over the upper branch. The color appears to have been reddish, with resplendent silvery reflections. Dorsal and anal fins reddish, as well as the suborbital. In liquor, this fish is silvery white, with a reddish tint on the sides, which have about twenty longitudinal golden lines. Head brilliant, with golden reflections. Suborbital, dorsal and anal fins reddish; the ventrals red. Caudal fin grey.

Fin rays, D. 12.12; P. 16; V. 1.5; A. 3.12; C. 17.

The liver very voluminous, divided into two lobes, which are subdivided into smaller ones. Air-bladder very large. The peritoneum reddish, with silvery reflections. Vertebræ twenty-four, of which ten are abdominal. The three first interspinals larger and wider than the others; the first of these supports the recumbent spine, which has furnished us with a specific name. The medial crest of the cranium is the only prominent one, and is not prolonged beyond the eyes; the space between them slightly arched. Bones of the shoulder not very stout. We do not find any notice of this fish in the memoir of Dr. Mitchill, although it appears to be common on the coast; for MM. Milbert and Lesueur have sent us a considerable number of specimens, some of them twenty-two inches long. We are strongly inclined to believe them to be the *Aurata bahamensis* of Catesby; if the teeth were not so long, we should have no doubt of it. In that case, it would be the *Sparus chrysops* of Linneus.

Such is the translation of the description of a fish from our coast, which the authors believe to be a new species. We are disposed to view it as one of a group of *Sparidæ*, characterized by a recumbent dorsal, and comprising the *S. arenosus* already noticed, and *P. argyrops* to be hereafter described. It may either be one of these, or a new species. Upon comparison with the first, it differs by its conical teeth, its six branchial rays and its want of bands, and

its occasionally greater size. It agrees so well with the *P. argyrops*, that we were at first almost inclined to believe it to be identical with that species. It appears to differ chiefly by the teeth. In *Chrysophris*, the molar teeth are said to be in three rows; while in the characters of *Pagrus*, there are two rows of molars, and, in addition, fine granular or card-like teeth on the sides. To make the *Gilt-head* identical with the *Big Porgee*, it is necessary to suppose, that with age, the lateral card-like teeth on the sides become broad and rounded like molars, such as are figured and described (pl. 9).

Schœpff (p. 151) has left a slight notice of a species, which (taken in connection with the observations of MM. Cuvier and Valenciennes) may allude to the Gilt-head above described:

"*Sparus chrysops*, L. *Aurata bahamensis*, CAT. (Carol. Vol. 2, p. 16. pl. 16.) *Porgee in Carolina*, Dr. GARDEN. The description agrees. I saw it in Providence,* under the name of *Maggot-fish*. Its forehead is smooth."

GENUS PAGRUS. *Cuvier.*

Four to six stout conical teeth in front of each jaw, and two series of round teeth on the sides. Many species have, behind the front teeth, numerous small granular or card-like teeth. Body generally deep.

THE BIG PORGEE.

PAGRUS ARGYROPS.

PLATE IX. FIG. 25. — (STATE COLLECTION.)

Sparus argyrops. LIN. p. 471.
Sparus, Poki or *Porgee.* SCHŒPFF, Fishes, &c. Vol. 8, p. 153.
Spare xanture. LACEP. Hist. Poiss. Vol. 4, p. 120.
Big Porgee of New-York, Labrus versicolor. MITCH. Tr. Lit. and Phil. Vol. 1, p. 404, pl. 3, fig. 7.
Le Pagre œil d'argent, P. argyrops. CUV. et Val. Hist. Poiss. Vol. 6, p. 164.
Scappaug, Scup, P. id. STORER, Fishes of Massachusetts, p. 38.

Characteristics. With brilliant metallic reflections on the sides. A short recumbent spine in front of the dorsal fin. The second and third dorsal rays often filamentous. Length 8 – 12 inches.

Description. Body much compressed, gibbous above. Height nearly one-half of the length. Scales large, adherent, rounded behind, finely denticulated; the radical portion straight, with radiating plaits, and festooned on its margin. Lateral line elevated, and, except near its origin, concurrent with the back. Facial line sloping, slightly arched over the orbits.

* We are left to conjecture whether Providence in the Bahamas, or in the State of Rhode-Island, is intended. Schœpff visited both places. I think it more likely that he meant the former. I know of no name of *Maggot-fish*, applied to any species on the coast of Rhode-Island.

Nostrils double, approximated; the posterior transversely oval, with a prolonged furrow towards the upper part of the orbit; the anterior nostrils round. Eyes large. Mouth with thick lips, protractile.

Upper jaw with six large blunt teeth, some of which, particularly the exterior, are conic at their summits, the others truncated; behind these are numerous smaller conical teeth, and on the sides of the jaw two series of flat-crowned molar teeth. Lower jaw with ten large front teeth, similar in shape and situation with those described above. Rounded tubercles in the pharynx, covered with numerous acute curved teeth.

The dorsal fin commences above the base of the pectorals; its spinous rays are lodged in a sheath, which is partially extended along the posterior branched rays: the first ray is very short, with a concealed recumbent spine at its base, directed forward; the second and third rays longest, with long membranous threads attached to them; these filaments are scarcely ever seen in the specimens which are brought to market, being easily destroyed from their excessive fragility; even in those drawn out of water, they are often absent. The first rays of the soft portion are simple, feebly spinous (in the figure this is not given); the remainder branched: this portion is higher than the posterior spinous rays. Pectorals pointed, very long, reaching to the eleventh spinous ray of the dorsal. Ventral fins robust, with a long pointed triangular accessory scale beneath, not reaching to the vent. The vent is a long, narrow longitudinal slit. Anal fin in a furrow, with three spinous and eleven branched rays. Caudal fin deeply lunated, rather than forked.

Color. Deep brownish black on the top of the head, passing into light brown towards the snout. Nape with brilliant green and golden reflections, which are also distributed over the sides. Irides silvery, with a bluish tint often mottled with brown. A black spot at the upper angle of the opercle, crossing the lateral line; another black spot just above the base of the pectoral fin. Dorsal, anal and caudal deep brown. Ventrals bluish. Pectorals light yellowish.

Length, 12·0. Depth, 4·5.
Fin rays, D. 1.12.12; P. 16; V. 1.5; A. 3.11; C. 17 $\frac{3}{3}$.

This well known and beautiful species is found in our waters in great abundance. They are most numerous in the summer season, but a few appear to remain during the whole year. It is a fish of excellent flavor, and were it not so abundant, would be more highly prized. It affords much sport to fishing parties, who go outside of the harbor in steam vessels and take them in great numbers. The name of *Porgee* has been stated to be of Indian origin, but I do not know upon what authority. The name of *Pogge* or *Porgy*, is applied in some districts of England to a species of *Aspidophorus*, which may have been borrowed by our ancestors.

The range of this fish southward extends to Charleston, and probably still farther south. Northwardly it is found as far as the coast of Massachusetts, south of Cape Cod. About the year 1833, we learn from Dr. Storer, that an attempt was made to introduce them into the

waters north of the Cape, but with no evident success, the water proving too cold to enable them to breed there.

Of the sixth Family MENIDÆ, I find no representative on the coast of New-York. One occurs on the southern coast, the *Gerris aprion*, or *Shad* of Catesby.

FAMILY VII. CHETODONTIDÆ.

Body compressed, scaly. The dorsal and anal fins thickly covered with scales, especially on their soft portions. Teeth bristly or trenchant. Palatines smooth, or furnished with teeth. Preopercle occasionally spinous. Dorsals two, or one only.

OBS. This family was established by Cuvier upon the genus *Chetodon* of Linneus, to which he added other genera with teeth of a different kind, but which had the other characters of scaly fins and a compressed body in common with that genus. The members of this family are almost exclusively confined to the seas of the torrid zone. Cuvier and Valenciennes describe one hundred and fifty species, included under eighteen genera. On the coast of New-York, I know of but one genus. I have annexed the description of another, which may possibly be found on our shores.

GENUS EPHIPPUS. *Cuvier.*

Dorsal deeply emarginate between the spinous and soft rays; the spinous part, which has no scales, can be folded into a groove formed by the scales of the back.

THE BANDED EPHIPPUS.

EPHIPPUS FABER.

PLATE XXIII. FIG. 68.—(CABINET OF THE LYCEUM.)

Faber marinus. SLOANE, Hist. Jam. Vol. 2, p. 251, fig. 4.
Cloudy Chetodon (*C. oviformis*). MITCH. Lit. and Phil. Soc. pl. 5, fig. 4; Am. Month. Mag. Vol. 2, p. 247.
L'Ephippe forgeron, E. faber. CUV. et VAL. Hist. des Poiss. Vol. 7, p. 113.

Characteristics. With six dark vertical bands over the body. Dorsal and abdominal outlines symmetrical. Length five to eighteen inches.

Description. Form regularly oval. Its height to its total length as four to seven. Scales moderate, rounded, the exposed portion radiately striate, with the edges finely denticulate, covering the whole head and body, except the region immediately round the nostrils; they ascend for more than two-thirds of the distance along the fins. Sixty-five were counted between the gills and tail, and forty-eight between the back and abdomen. Lateral line nearly concurrent with the back. Eyes large, 0.4 in diameter. Nostrils double; the posterior oblong, oblique, near the edge of the orbit; the anterior smallest, round and tubular. Mouth

small, with thick fleshy lips concealing the fine bristly teeth, which are arranged in six or eight contiguous series. A row of eight minute apertures under the chin. The opercle has a slight rounded prominence on its margin.

The dorsal fin is divided into two portions: the first consists of nine spines, commencing at the highest point of the back; the first two spines very short, and nearly concealed; the third 1·7 long, with a filament nearly as long as the spine; the others are very small, and the last is closely applied to the second dorsal fin. This latter fin is triangular, with its margin excavated and nearly vertical; the three first rays are simple, the remaining twenty-two branched; the fifth and sixth longest; the others rapidly diminishing in length. Pectorals short, somewhat oval, and placed about one-fourth of the distance between the abdomen and back. Ventrals of one spinous and five soft rays; the first soft ray filamentous, reaching to the anal fin, with a long accessory plate at its base. Anal opposite to, and similar in shape and size with the soft dorsal; it has three concealed spines, of which the first is shortest. Caudal lunate.

Color. Brownish, with six broad vertical dusky bluish bands: one through the eye; the second over the base of the pectorals; the third, from the spinous part of the dorsal, is narrow, and scarcely descends below the lateral line; the fourth passes from the latter part of the spinous portion of the dorsal, to similar parts in the anal fin, and is irregularly dilated beneath; the next passes from the posterior part of the soft dorsal to corresponding parts in the anal; the last band passes over the base of the tail.

Length, 7·2. Depth, 4·2.
Fin rays, D. 9.3.22; P. 18; V. 1.5; A. 3.18; C. 16.

Linneus undoubtedly included this species with his *Chetodon triostegus*, which, however, belonged to another genus. In applying the name of *faber*, Cuvier and Valenciennes adopted the prior name given by Sloane; and hence the *C. oviformis* of Mitchill, which preceded that given by the above mentioned writers, becomes a synonime. They were not aware, at the time of publication, of the existence of Mitchill's name or description.

The geographical range of this species is very great, extending from Rio Janeiro to New-York. In our waters, it only appears periodically, and occasionally in great numbers during the summer months. About twenty years since they were caught here in seines in great numbers, and exposed in the markets for sale. Some of them were eighteen inches long. Those described by Mitchill were captured in 1815 and 1817. The popular names of *Three-tailed Sheepshead*, and *Three-tailed Porgee*, were given them by the fishermen in allusion to their prolonged dorsal and anal fin. They appear to be much larger than those described by Cuvier. Schœpff states that it is called *Angel-fish* in Carolina.

THE MOON-FISH.

EPHIPPUS GIGAS.

PLATE XXIII. FIG. 74. — (CABINET OF THE LYCEUM.)

L'Ephippe géant, E. gigas. CUV. et VAL. Vol. 7, p. 121.

Characteristics. Body without bands or spots. Crest of the cranium enlarged. Opercle more crenulate than in the preceding. Length 15 inches.

Description. Body oblong oval; the outline above the branchial aperture enlarged. Scales large, orbicular, and of a robust texture. Lateral line concurrent with the back. Eyes, nostrils and opercle as in the preceding species. The preopercle, however, appears to be more distinctly crenulated on its margin. Teeth conic, bristly, in numerous series. Branchial rays, six.

The dorsal fin composed of eight spines and 1·21 softer rays; the longest rays appear to be more prolonged than in the preceding species, and more arcuated on the outer margins, but resemble them in shape. Ventrals with one spinous and five soft rays; the second ray filamentous, but does not extend to the anal fin. Anal with three spinous rays, and eighteen soft rays. Caudal fin very wide, excavated on its margin. The first interspinous bone of the anal is club or mallet-shaped.

Color. Dark bluish brown, with metallic lustrous reflections, and without spots or bands. The sides of the head tinged with lustrous green.

Length, 15·0. Depth, 8·0.
Fin rays, D. 8.1.21; P. 16; V. 1.5; A. 3.18; C. 17 $\frac{3}{3}$.

I have never seen but the specimen in the Cabinet of the Lyceum, from this harbor; and the description has, therefore, all the imperfections arising from observations made on a preserved specimen. It is rare on our coast, the mouth of the Hudson river being probably its northern limit. It was sent to Cuvier from New-York. Along the coast, it ranges to Rio Janeiro, and probably still farther south.

GENUS PIMELEPTERUS. *Cuvier.*

With a single dorsal fin. With cutting teeth in both jaws; the teeth implanted in the jaws by means of a heel extended horizontally backwards.

Obs. This genus was remodelled by Cuvier, from the several genera *Xystère*, *Dorsuaire* and *Kyphose*, proposed by Lacépède. It comprises ten species, principally from the Indian seas and the coast of Guinea. One is found along our shores.

THE RAZOR-FISH.

PIMELEPTERUS BOSCII.

PLATE XX. FIG. 66.

Pimelepterus boscii. LACEP. Vol. 4, p. 429 and 430.
Pimelepière de Bosc. CUV. et VAL. Hist. des Poiss. Vol. 7, p. 258, pl. 187.

Characteristics. Body oval, brownish, with faint longitudinal lines. Length six inches.

Description. Form almost regularly oval. Scales on every part of the body, except the lips; those on the body semi-elliptic, longer than wide, finely ciliated on their free margins; sixty in a longitudinal, and thirty in a vertical direction. Lateral line concurrent with the back. Snout rounded, and vertical at its extremity. Length of the head to the total length as 1 to 4·25. Eyes large, distant apart more than their diameters. The anterior nostril small, round, with a raised margin; the posterior larger, oval. Teeth 22 – 24 in a single series: on the salient portion they are oval, flat, with a cutting edge; the base is attached to a horizontal process nearly as long as the teeth, pointing backwards, and attached to the jaw; behind these, a band of fine velvet teeth. A rough line on each palatine; a crescent-shaped rough plate on the anterior part of the vomer; and a large oval disc on each pterygoid. Tongue wide, rounded, free. Preopercle finely striated on its margin, the angle rounded. Branchial rays seven.

The dorsal fin commences over the base of the ventrals, and is continued to within an inch of the base of the caudal; its soft portion, as well as that of the caudal and anal, is thickly covered with scales. Pectorals oval, the fourth and fifth rays longest, the first simple and very short. Ventral arises under the middle of the pectorals, and hence would be considered as an abdominal fin; but the basin is suspended to the bones of the shoulder, and hence we consider it sub-brachial. A small scaly fold above its base, forms a slight furrow for its reception. The anal commences under the penultimate spine of the dorsal, and is coterminal with that fin. Caudal crescent-shaped.

Color, as it appeared in liquor, brown, deeper on the fins and snout. 20 – 22 longitudinal lines beneath, and 10 – 12 above the lateral line.

Length, 5·0.

Fin rays, D. 11.12; P. 19; V. 1.5; A. 3.13; C. 17.

I have not seen this species, and am indebted to Cuvier for the description and figure. It appears along our southern shores, and I have thought that it would not be unacceptable to illustrate a genus of which specimens may yet be found on the coast of New-York.

The eighth family of *Pharyngiens labyrinthiformes*, or ANABASSIDÆ, has no representative on our coast.

FAMILY IX. SCOMBRIDÆ.

Vertical fins without scales. No spines nor denticulations on the opercle or preopercle. Scales small, entire.

OBS. This family embraces fifty-one genera, which at present include over four hundred species. Among all the families of fishes, this is one of the most useful to man.

GENUS SCOMBER. *Cuvier.*

Dorsal fins two, widely separated. Finlets behind the dorsal and anal fins. Sides of the tail raised into two small cutaneous crests. Scales uniformly small.

THE SPRING MACKEREL.

PLATE XII. FIG. 34.

Scomber scomber? SCHŒPFF, Beobacht. Vol. 8. p. 168.
Spring Mackerel, S. vernalis. MITCH. Tr. Lit. and Phil. Soc. Vol. 1, p. 423.
La Maquereau printanier. CUV. et VAL. Hist des Poiss. Vol. 8, p. 48.
Spring Mackerel, S. id. STORER, Report on Fishes of Mass. p. 41.

Characteristics. With a dark spot at the base of the pectoral and ventral fins. Length 16 – 18 inches.

Description. Body fusiform, cylindrical, its greatest depth near the ultimate rays of the first dorsal. Scales very minute. Lateral line follows the dorsal outline, but is slightly irregular in its course, and becomes nearly effaced towards the tail. Eyes large; a nictitating membrane, from the anterior and posterior part of the orbits, partially covers the eye. Nostrils single, nearly equidistant between the eyes and the end of the nose. Lower margin of the preopercle with a series of mucous pores. About fifty-five small recurved teeth on each side of the lower jaw; the anterior space edentate. On each intermaxillary there are about forty very minute teeth, nearly concealed by a membrane. Tongue pointed, distinct and black. There are slight asperities on the vomer, and very long, slender and flexible teeth on the pharyngeals. Branchial rays delicate. Gill arches with two series of alternate tubercles; the first arch with long pectinated processes.

The first dorsal rises over the ventrals, longer than high, and contains thirteen simple and slender rays; the first somewhat shorter than the second, which is longest; thence gradually

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diminishing to the last, which scarcely appears above the surface, being concealed in a deep and narrow fissure extending backward about a fourth of an inch. There is, however, no distinct furrow for the reception of the whole fin. The second is one-third the height of the first, and its distance from the anterior ray of that fin is equal to the space between the vent and the bifurcation of the caudal fin; it is composed of ten rays, some of which appear to be double. Behind these are the spurious fins or finlets, six in number, equidistant, each composed of one ray with a long posterior branch. In some individuals, (as in the plate,) the first finlet is small and simple. I have seen them with only four finlets above and beneath, but five appears to be the normal number. The last finlet may be said to be composed of two rays, both ramose, the posterior almost reaching the accessory rays of the caudal fin. Pectorals moderate, acute; the first and second rays articulate, simple, shorter than the third; the fourth longest. Two or three of the posterior rays scarcely distinguishable; the tip reaches to the fourth ray of the first dorsal. The ventrals are situate behind the last rays of the pectoral; its first ray simple, slender, shorter than the second; the two following, with all the others, branched; a delicate membrane connects this ray with the skin: the whole fin lies in an obsolete furrow. A low spine before the first ray of the anal fin, which is short and simple; the second articulated; the third highest, and, with the remainder, branched; the whole fin is longer than high, slightly excavated on its outer margin. Five equidistant finlets behind the anal, the last distinctly two-rayed. Caudal fin deeply forked, with eight articulated accessory rays on each side.* The middle rays are so ramose as to render it difficult to count them. Two small cutaneous elevations of the skin or ridges on each side of the tail; they diverge forward, and are about 0·5 long. The excretory duct opens behind the vent by a separate aperture. No vestige of an air-bladder.

Color. Resembling that of its congeners: the colors of this fish are exceedingly vivid. Dark steel-blue above, becoming lighter on the sides, and mixed with metallic green near the lateral line. From 24 – 30 vertical deep blue half-bands, which are sometimes angular like the military *chevron*, often waved, interrupted, and occasionally forming irregular circles. Below the lateral line, and parallel with it, is a longitudinal dull brownish line, often interrupted, and sometimes forming a series of inequidistant irregular spots: occasionally both line and spots wanting. Beneath silvery, with greenish and yellowish metallic reflections. A black blotch at the base of the pectorals and ventrals. Pectorals, second dorsal and caudal dark-colored; the remaining fins lighter. Irides white, with a slight tinge of yellowish.

Length, 15·0 – 17·0. Depth, 2·5 – 3·0.
Fin rays, D. 13.10 + vi; P. 17; V. 6; A. 12 + v; C. 15 $\frac{8}{8}$.

Schœpff unquestionably alludes to this species under the head of *S. scomber:* "About the "end of May and the beginning of June, these fish arrive in great scholes at New-York and

* Some modern ichthyological writers consider as accessory rays, all exterior to the two longest rays on each side, and do not enumerate them. In the case of lanceolate or rounded rays, this cannot be done; and we therefore think it advisable, in all cases, to enumerate all the rays.

" the neighborhood. They are then caught in great numbers, and salted. They have the " five pinnulæ described by authors, and do not materially differ in the number of their fin " rays. It is, however, maintained by some that the American Mackerel is a larger fish, and " has a somewhat different appearance; hence, for the sake of distinctness, they are called " by some the *Horse Mackerel*. A more rigorous comparison is therefore required to deter- " mine whether the European and American species are identical."

They appear on our coast in the months of May and June, but their numbers vary in different years. On the coast of Massachusetts, where the fishery is most productive, more than two hundred vessels are sometimes engaged in this business; and according to Dr. Storer, in 1837, 234,059 barrels were taken, equal in value to $1,639,042.

The northern range of this species appears to extend a very short distance beyond Cape Cod. Its southerly range has not been ascertained, but it probably extends to the Caribbean sea.

THE FALL MACKEREL.

SCOMBER GREX.

PLATE XI. FIG. 32.

Thimble-eyed, Bull-eyed or *Chub Mackerel, S. grex.* MITCH. Lit and Phil. Vol. 1, p. 422.
Le Petit Maquereau de l'Atlantique. CUV. et VAL. Hist. des Poiss. Vol. 8, p. 45.

Characteristics. Small. A black spot at the base of the pectorals and tip of the lower jaw. Dorsal bands very tortuous. Length 8 – 10 inches.

Description. Head one-fourth of the total length. Lateral line slightly irregular, but nearly concurrent with the back. Eyes large and prominent. Nostrils double, distant. Teeth minute, acute, distant, varying in number from 40 – 70 according to the size of the fish; in our specimen, 52 – 58 in each jaw.

The first dorsal fin triangular; the first ray slightly shorter than the second, which is longest; thence successively diminishing to the last, which scarcely appears above the dorsal furrow: it arises 0·4 behind a point vertical to the pectorals, and contains twelve slender rays. The second dorsal longer than high, of twelve rays, with a nearly straight margin; the first shorter than the second, which, together with the third and fourth, are longest; thence gradually decreasing to the antepenultimate ray, which is shorter than the two last: this fin arises very shortly before the anal. Five dorsal pinnulæ. Pectorals very broad, with nineteen rays. The first ray of the anal fin a short, simple, and rather broad spine; the third and fourth rays longest: posterior to this are five finlets. Caudal fin furcate, with two short and obvious carinæ on each side of the tail.

Color, as in the preceding, with the exceptions noted in the specific phrase. Margin of the tail dark-colored at the angle. A small well defined straight black line on the dorsal ridge, between the two dorsal fins; the second scarcely darker than the first dorsal.

Length, 9·5. Of head, 2·4.
Fin rays, D. 12.12 + v; P. 19; V. 1.5; A. 1.12 + v; C. 20 $\frac{8}{6}$.

In the autumnal months, this species appears in great numbers on our coast. Dr. Mitchill mentions the autumns of 1781 and 1813, as years in which they were particularly numerous. In the early part of November, 1828, they were also very abundant, and many persons were poisoned by eating them. They are scarcely distinguishable from the preceding, and hence Richardson and Storer have regarded them merely as the young of that species. From the considerations noted above, I prefer, with Cuvier, to regard it as a distinct species.

It ranges from the shores of New-York, and (if there is no mistake in the locality) even from Canada to the coast of Brazil.

THE SPANISH MACKEREL.

SCOMBER COLIAS.

PLATE XI. FIG. 33.

Le Maquereau colias. CUV. et VAL. Hist. des Poiss. Vol. 8, p. 39, pl. 209.
S. colias, Spanish Mackerel. STORER, Report Fishes of Mass. p. 45.

Characteristics. Large. Numerous greyish brown spots distributed along the sides. Length one to two feet.

Description. Body cylindrical, robust. Head considerably flattened above. Eyes large. Nostrils double; the posterior vertical, and just in advance of the eye. Scales rather larger about the pectoral region. Tongue pointed. Jaws equal, with from sixty to seventy small teeth on each side of the jaws.

The first dorsal fin transparent; its second ray longer than the first, the tips of all projecting beyond the membrane. Second dorsal considerably excavated on its margin. Five dorsal finlets. Pectorals pointed, and just beneath the lateral line. Ventrals elongated, slightly in advance of the first dorsal, but posterior to the base of the pectorals. Anal with a small spine in front, opposite to the posterior half of the second dorsal; behind this, five finlets. Caudal fin deeply forked, with two lateral carinæ at the side.

Color. Above light green, with numerous contiguous beautifully undulating darker green lines passing down the sides, and just crossing the lateral line. Beneath dull bluish, with large, distant, circular or oblong oval brown blotches distributed irregularly on the sides. Abdomen light-colored, with cupreous reflections. Opercles cupreous and silvery.

Length, 11·0. Head, 2·5.
Fin rays, D. 9.12 + v; P. 19; V. 5; A. 1.12 + v; C. 17 $\frac{4}{4}$.

I have seen this fine species in the New-York market, in the months of August and September, nearly two feet long. They were not, however, common. They had been taken in a seine in the harbor. On the southern coast, they are taken with a hook attached to a short

chain. They are excellent eating. If this species is identical with the *S. colias* of Europe, it has a wide geographical range; crossing the ocean from the Mediterranean, and occurring along our coast from Massachusetts to Carolina. In the plate, it is erroneously represented as of the natural size.

GENUS THYNNUS. *Cuvier.*

Scales on the thorax larger, forming a sort of corselet. Two dorsals, the first reaching nearly to the second. A single row of small, pointed, crowded teeth in each jaw. Numerous finlets behind the dorsal and anal fins. A long elevated crest on each side of the tail.

Obs. The fish of this genus have the general form of the Mackerel, but are less compressed. As now restricted by Cuvier, it contains eleven species, of which three occur along the coast of South America. On our coast we have, as a straggling visitor, the celebrated *Tunny* of Europe, which appears in such immense scholes along the shores of the Mediterranean and Euxine seas.

THE COMMON TUNNY.

THYNNUS VULGARIS.

PLATE X. FIG. 28.

Thynnus vulgaris, Le Thon commun. Cuv. et Val. Vol. 8, p. 58, pl. 210.
T. id., The Common Tunny. Storer, Massachusetts Report, p. 47.

Characteristics. Very large and long pectorals. Corselet pointed behind. No colored lines nor spots. Length 9 – 12 feet.

Description. Form elongated, fusiform. Length of the head, 27·0. Jaws, when closed, nearly equal. Tongue large and broad. Gape of the mouth very large. Eyes circular, and twelve inches apart. Gill-covers smooth, and very large. Scales on the anterior part of the back, in front of the first dorsal, and beneath the pectorals, very large.

First dorsal fin with very robust rays; it begins twenty-seven inches from the end of the snout, and its first ray is nine inches long, and from this the rays gradually diminish in size: this fin, when recumbent, is concealed in a deep groove. The second dorsal rises shortly behind the first, is twelve inches high, and five inches along the base, very robust and triangular; behind this are nine finlets. Pectorals falciform, sixteen inches high. Ventrals beneath the pectorals, in a groove at their bases. Anal fin posterior to the second dorsal, fifteen inches high; and posterior to this, nine finlets. Caudal fin lunated, measuring twenty-nine inches across the tips. The keel or ridge on each side seven inches long, and an inch and a half high; a smaller keel on each side of the larger one, three inches long.

Color. Upper surface blackish; sides silvery; beneath white. Tongue and inside of the mouth black. Irides golden, with greenish reflections. Gill-covers silvery grey. First dorsal blackish; the second reddish brown. Finlets bright yellow, dark at the base and upon the anterior edge. Pectorals silvery grey. Ventrals blackish above, beneath white.

Length, nine feet three inches.
Fin rays, D. 14.13 + ix; P. 34; V. 1.5; A. 2.12 + ix; C. 19.

The only American writer who has described the Tunny, as it appears on our coast, is Dr. Storer, whose description I have adopted above. It agrees essentially with the characters assigned by Cuvier to the Tunny of the Mediterranean, which occasionally ascends as high up on the shores of Europe as Norway. It was formerly very abundant at Eckford bay in the Baltic sea. Dr. Storer mentions one taken near Cape Ann, weighing one thousand pounds. I have met with this fish almost every season in the New-York market, but it was always cut up into small pieces for sale. The fishermen state that it is taken frequently off Block island, but I have never been so fortunate as to meet with a perfect specimen. In the Caribbean sea, there is a species of tunny which passes with several other fishes under the name of *Bonito*, and which occasionally appears along our southern coast.

(*EXTRA-LIMITAL.*)

T. coretta. (Cuv. et Val. Vol. 8, p. 102.) Corselet truncate; scarcely emarginate behind. Second dorsal and anal low. D. 13.1.14 + viii; P. 31; V. 1.5; A. 2.12 + viii; C. 35. *Gulf of Mexico.*

GENUS PELAMYS. *Cuvier.*

Two dorsals. The corselet small. Teeth stout, acute, distant.

THE STRIPED BONITO.

PELAMYS SARDA.

PLATE IX. FIG. 27.

Scomber sarda. Bloch, Systema, p. 22, pl. 334.
Bonetta, S. id. Mitchill, Tr. Lit. and Phil. Soc. N. Y. Vol. 1, p. 428.
Le Bonite à dos rayé, Pelamys id. Cuv. et Val. Hist. des Poiss. Vol. 8, p. 149, pl. 217.
The Skip-jack, Pelamys id. Storer, Massachusetts Report, p. 4.

Characteristics. Blue above, with from 6 – 8 parallel dark stripes on the upper part of the body and sides. Length 12 – 20 inches.

Description. The body has the general form and proportions of the common Mackerel, but is a larger and more robust fish. Its height to its length is as one to four. Body fusiform. The keel on the sides of the tail elevated, triangular, with two smaller ones on each side on the base of the caudal fin. Under a lens, the body appears covered with a fine network of exceedingly minute scales. The corselet, or that part which is covered with larger rounded and more distinct scales, is of a triangular shape, extending from above the branchial aperture to a short distance beyond the tip of the pectoral, and from thence descends with a slightly concave line towards the lower part of the opercle. Lateral line irregularly flexuous in its course,

and does not assume a distinct and regular curvature. Eyes large, nearer the snout than to the margin of the opercle. Nostrils double; the posterior a vertical slit. Mouth opening beyond the orbits. In each jaw, a series of twenty to twenty-five sharp distant teeth, curved inwards. A row of minute teeth on the palatines, and two rounded patches of teeth at the base of the tongue.

The first dorsal long and low, feebly spinous, lodged in a deep groove, and commencing over the base of the pectoral; the anterior are longest. The second dorsal commences a short distance behind the first, and is deeply emarginate on its posterior margin; the two first rays spinous: posterior to this are 8 – 9 finlets. The pectorals are short, triangular, and lodged in a shallow cavity. Ventrals beneath the pectorals, small, and also lodged in a similar cavity. The anal fin commences under the end of the second dorsal, which it resembles in shape and size; beyond this, are seven finlets. Caudal fin widely lunate.

Stomach, a long narrow sac, with a strong convolution, from which arises the pyloric orifice, with numerous cæcal appendages. Liver of two lobes, and very large. Gall-bladder very long, extending nearly the whole length of the abdominal cavity. No air-bladder.

Color, of the summit of the head and upper part of the sides, dark plumbeous. Abdomen and sides ashen grey, mixed with blue. Irides white. Ventrals white; the other fins dark bluish black. A series of 6 – 8 parallel, somewhat oblique, longitudinal, narrow dark stripes on the sides, slightly descending forwards, the greater part crossing the lateral line. In young individuals, there are from 6 – 8 broad and vertical deep blue bands, crossing the narrow longitudinal stripes at right angles. In older specimens, such as that figured in the plate, these bands become almost effaced or entirely wanting; even in young individuals they become more obscure after death. Tongue and inside of the mouth deep black.

Length, 20. Depth, 4·75.
Fin rays, D. 22.2.12 + ix; P. 24; V. 1.5; A. 2.12 + vii; C. 27 $\frac{3}{8}$.

The Striped Bonito is but an occasional visitor to our coast. The specimen which furnished me with the preceding description, was taken in September, in the harbor of New-York, in company with many others.

Its geographical range appears to be extensive, although its chief habitat seems to be in the Mediterranean. It has been taken off the Cape de Verd islands, on the coast of Brazil, and along the shores of North America as far as Cape Cod.

GENUS CYBIUM. *Cuvier.*

Teeth large, pointed, usually compressed, trenchant and lancet-shaped. Body without a scaly corselet. Palatines and front of the vomer with asperities. First dorsal very long.

THE SPOTTED CYBIUM.

CYBIUM MACULATUM.

PLATE LXXIII. FIG. 232.

The Spanish Mackerel, Scomber maculatus. MITCH. Lit. and Phil. Soc. Vol. 1, p. 426, pl. 6, fig. 8.
Le Tassard tacheté, Cybium id. CUV. et VAL. Hist. Poiss. Vol. 8, p. 181.

Characteristics. Greenish and lead-colored above; sides silvery, with numerous yellowish large spots. First dorsal fin black in front. Lateral line waved. Length 18 – 20 inches.

Description. The shape and general appearance of the *Scomber colias*. Head pointed, and to the whole length as one to six nearly, with the lower jaw somewhat longest and rounded. Lateral line following the general curve of the back nearly, but meandering in a very irregular and serpentine course. Eyes very large. Mouth large, armed with distinct, acute, and slightly conic teeth, except in front, where they are wanting.

The first dorsal fin with seventeen rays, of which the fourth and fifth are longest; nearly all may be concealed in a furrow. The second dorsal triangular, excavated on its upper margin, and containing two simple and fifteen branched rays: behind this are eight (nine according to Cuvier) finlets; and posterior to the anal, nine or ten finlets. Pectoral fins pointed, with twenty-two rays. Ventrals small. Anal fin with two simple and fifteen soft rays, similar in shape to the second dorsal. Caudal broadly lunate. Branchial rays seven.

Color. Greenish above, blending into ashen grey. Sides and all beneath lustrous white. About twenty yellowish rounded spots, a quarter of an inch in diameter, irregularly distributed along the sides. First dorsal fin black as far as the eighth or ninth ray. Pectorals brownish externally, black within. Ventrals and anal whitish.

Length, 18·0 – 24·0.
Radial formula, D. 17.2.15 + x; P. 22; V. 1.5; A. 2.15 + ix; C. 22.

It occurs sparingly in our waters from July to September, and is considered good eating. New-York appears to be its northernmost limits. It extends through the Caribbean sea to the coast of Brazil.

EXTRA-LIMITAL.

C. regale. (CUV. et VAL. Vol. 8, p. 184.) Teeth compressed and trenchant. A broad brownish longitudinal band, with roundish spots above and beneath. Length one to two feet. *Gulf of Mexico.*

GENUS TRICHIURUS. *Linneus, Cuvier.*

A single continuous dorsal fin. No corselet nor caudal ridge. No ventral nor caudal fins. Body elongated, compressed, ribbon-shaped. Tail ending in a filament.

THE SILVERY HAIR-TAIL.

TRICHIURUS LEPTURUS.

PLATE XII. FIG. 35. — (STATE COLLECTION.)

Trichiurus lepturus. LIN. Syst. Nat.
Silvery Hair-tail, T. argenteus. MITCHILL, Lit. and Phil. Tr. Vol. 1, p. 364.
Le Trichiure de l'Atlantique. CUV. et VAL. Hist. Poiss. Vol. 8, p. 237.
T. armatus et *muticus.* GRAY, Griff. Cuv. Vol. 10, p. 349, pl. 6.

Characteristics. Uniform silvery. Head one-seventh of the total length. Lateral line yellow. Length 28 inches.

Description. Body long, tapering, compressed. Back acute, and abdomen more full and rounded. Tail compressed, tapering very gradually to a fine point, three inches and a half long from the end of the dorsal. A smooth silvery easily detached skin, with no vestige of a scale apparent under the magnifier. Lateral line distinct, arising from the upper part of the branchial aperture; curves down parallel with the superior margin of the opercle; passes down behind the pectoral; descends to the lower third of the body, thence running parallel and near the edge of the abdomen; passes through the tail, and may be traced to the extreme tip: it is of a greenish yellow color. Head flattened between the eyes, becoming ridged on the nape towards the dorsal fin; compressed laterally, becoming more acute beneath. Its length from the tip of the lower jaw to the point of the opercle, five and a half inches; depth of the head across the base of the pectorals, three inches. Eyes large, circular, prominent, three quarters of an inch in diameter, and less than their diameter apart. Nostrils single, large, vertically oval, near the eye. Lower jaw longest, with distant acute teeth, of which the two anterior are largest, and when the jaw is closed, extend outside of the tip of the upper jaw. The four or six posterior teeth on the sides are longest; the intermediate shorter. A fold of the skin across the interior of the upper jaw. The two anterior teeth are minute, but immediately behind them are two long curved teeth, barbed at their tips; these are received into a cavity in the lower jaw. Posterior to these, on the interior edge of the jaw, are from six to ten long, compressed, pointed and lancet-shaped teeth on each side. Minute teeth on the palatines. Tongue free, subacute, smooth, except the asperities on its tip. Seven branchial rays. Opercle ending in a point; its tip extending beyond the base of the pectoral fin, and, with its upper margin, ending in fibrous threads.

The dorsal fin commences above the upper angle of the gill opening, slightly elevated in the middle, where it is two inches high, and gradually disappears in the skin about three and a half inches from the tip of the tail; it is composed of flexible feebly spinous rays.

Pectoral fins two inches and a half long, small, broad, obtusely pointed, with the third and fourth rays longest. Vent thirteen inches distant from the tip of the lower jaw. About one hundred and twenty spines were enumerated posterior to the vent, and on the under side of the tail, sensible only to the touch behind: they occupy the place of the anal fin.

Color. The whole surface of the head and body of a lustrous silvery hue, with iridescent hues on the opercles. Eyes with yellow irides. Lateral line greenish yellow. Pectorals light yellowish at the base; minute, punctate, and brownish at the tips. Teeth reddish brown at the base, lighter at the tips. Dorsal light yellow, obscurely bordered above with dusky.

Length, 38·0. Of head, 5·5.
Fin rays, D. 133; P. 12.

This is known here by the fishermen under the name of *Ribbon-fish.* At Jamaica, it is called *Sword-fish.* It is not common, but of fifteen or twenty which I have examined, the above, taken from the ocean near Sandyhook, in August, was the largest.

It has an extensive geographic range. It is most numerous in the Caribbean sea, and more especially about Porto Rico. D'Orbigny found it near Montevideo, in 35° south latitude; and Dr. Pickering informs me that he has seen it in Narraganset bay, on the coast of Massachusetts, in 42° north latitude. It has also been found on the coast of Africa; but whether it has ever appeared on the coast of Europe, is doubtful. The description of a *Trichiure* by Mr. Hoy in the Linnean Transactions of London, applies to the *Trichiurus argenteus* of Cuvier and Valenciennes, a species which has figured in the writings of naturalists under five different generic and eight specific names. Among the drawings of Dr. Holbrook, there is a figure of a Hair-tail which seems to announce a new species: there is a short triangular dorsal in front of the long dorsal, or at least it is deeply divided.

GENUS XIPHIAS. *Linneus, Cuvier.*

The upper jaw elongated into a sword. Body fusiform, covered with minute scales. No ventral fins. Mouth without teeth. Sides of the tail ridged.

THE COMMON SWORD-FISH.

XIPHIAS GLADIUS.

PLATE XXVI. FIG. 79. ONE-SIXTEENTH OF THE NATURAL SIZE.

Xiphias gladius. LINNEUS, Syst. Nat. 12 Ed. p. 432.
X. id., Sword-fish. MITCHILL, Am. Month. Mag. Vol. 2, p. 242.
L'Espadon épée, X. gladius. CUV. et VAL. Hist. des Poiss. Vol. 8, p. 255, pl. 225; and 226, adult and young.
The Sword-fish, X. id. STORER, Massachusetts Report, p. 51.

Characteristics. Dorsal fin in the young, single; becoming effaced in the middle, and forming two distant fins in the adult. Length 10 – 15 feet.

Description. Surface of the body and head very slightly roughened in the young, of a foot or eighteen inches long. There are numerous series of tubercles on the body, which disappear with age. Lateral line scarcely perceptible, except near the opercles, where it is irregularly sinuous. A lateral carina on each side of the tail, from 6 – 8 inches long; the caudal portion with a transverse furrow. Eyes very large and rounded. Nasal orifices contiguous; the posterior largest; the anterior rounded, with a raised margin. Upper jaw produced into a flattened sword; the edges bluntly trenchant, and approaching each other and terminating in a blunt point. On the upper side, this is minutely striate, and elevated in the centre; this elevation becomes gradually effaced about the middle, where a groove extends to the tip. Lower jaw short and pointed. The gape of the mouth extends behind the orbits. No teeth, but slight asperities may be felt on the lower jaw, and velvet-like teeth in the throat. A membrane within both jaws. Tongue rudimentary. Seven flat branchial rays. Gills, instead of being pectinated, are retiform, and, as Mitchill has observed, are of a spongy texture.

The dorsal fin, which in the young forms one long, high and nearly equal fin of forty-three rays, extending nearly to the tail, becomes obliterated for the greater part of its length, and in fact is divided into two distant fins. This curious fact, which is now well established, may serve to explain why the descriptions of this fish agree so little with each other, and why distinct species have been created out of but one. In the adult, the dorsal is falciform, with from 18 – 20 rays; the posterior part is represented by a few rays. Pectorals falciform, elongated, placed very low down, and composed of sixteen rays, of which the three first are very long. Ventrals none. The anal fin commences under the posterior third of the dorsal, falciform in front, low behind; but in the adult, this fin likewise becomes obliterated in the middle, and divided into two. Caudal fin crescent-shaped, with 17 rays.

Color. Bluish black above; silvery on the sides. Pectorals dark blue above; beneath whitish. Sword dark brown above; whitish beneath. Anal whitish.

Length, 10 – 15 feet.
Fin rays: Young, D. 3.40; P. 16; A. 17; C. 17 $\frac{4}{4}$.
Adult, D. 18.3; P. 16; A. 11.3; C. 17 $\frac{4}{4}$.

In 1791, a Sword-fish was exhibited in New-York, sixteen feet long. In 1817, another was taken by a harpoon off Sandyhook, twelve feet long, and described by Mitchill as cited above. In some years they are quite abundant. In the summer of 1840, the New-York markets were well supplied with the sword-fish. It is preferred to halibut or sturgeon, which in flavor it somewhat resembles. According to Dr. Storer, about two hundred barrels are annually taken at Martha's Vineyard, south of Cape Cod, and sold at three or four cents per pound.

The Sword-fish has a great range on the eastern side of the Atlantic, and is one of the few which cross this ocean. It feeds on mackerel and other gregarious fishes.

GENUS NAUCRATES. *Cuvier.*

Tail ridged on its sides. Ventral fins thoracic. Dorsal fin single, elongated, with free spines before it and the anal fin. Body covered with small scales. Branchial rays seven. Teeth small and numerous. No finlets.

THE NEW-YORK PILOT-FISH.

NAUCRATES NOVEBORACENSIS.

Gasterosteus ductor, Pilot-fish. SCHŒPFF, Beobacht. Vol. 8, p. 167.
Scomber ductor, Pilot-fish. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 424.
Le Pilote de New-York, N. noveboracensis. CUV. et VAL. Hist. Poiss. Vol. 8,.p. 325.

Characteristics. Four transverse blue bands, and four spines before the dorsal. Opercle not striated.

We have little information to give in relation to this fish. Schœpff first noticed it in his catalogue, supposing it to be the common Pilot-fish of the Atlantic. Mitchill entertained the same idea. Cuvier received specimens from New-York, which closely resembled the *ductor;* but he treats it as distinct, on account of its striated opercles. In liquor, his specimens appeared to be yellow, with lilac bands. It is very probable that independent of this species, the true *N. ductor* or Pilot-fish must occasionally appear in our waters, and hence I have added a figure of that species. I have, however, never met with it.

(*EXTRA-LIMITAL.*)

N. ductor. (Cuv. et. Val. Vol. 8, p. 312; and pl. 74, fig. 235 of this work.) Bluish, with five darker transverse bands; two of them passing through the dorsal and anal fins. Tail bordered with dark blue, tipped with white. 4 – 12 inches. *South-Carolina.*

GENUS ELACATE. *Cuvier.*

Head depressed. No carina on the sides of the tail. No finlets. Body elongated. No free spines before the anal. Ventral fins thoracic.

THE NORTHERN CRAB-EATER.

ELACATE ATLANTICA.

PLATE XXV. FIG. 77. ONE-FOURTH NATURAL SIZE.

Gasterosteus canadus. Lin. Syst. Nat. 12 Ed. p. 491.
Scomber niger. Bloch, pl. 337.
Centronote gardenien. Lacepede.
The Crab-eater, Centronotus spinosus. Mitchill, Lit. and Phil. Soc. Vol. 1, p. 490, pl. 3, fig. 9.
L'Elacate d'Amérique, E. atlantica. Cuv. et Val. Hist. Poiss. Vol. 8, p. 334.

Characteristics. Deep black above; lighter on the sides; white beneath. A slate-colored band along its side. Length 15 to 30 inches.

Description, from a recent specimen. General form and color of an *Echeneis*. Head broad, and rounded at the snout; it is depressed as far back as the first dorsal spine. Body cylindrical, tapering. Scales minute, oblong, impressed, and ascending far up the vertical fins. Lateral line irregular in its course, and indistinct. Nostrils double, nearer the eyes than to the snout; the anterior vertically oval. Eyes large; irides white. Teeth on the lower jaw minute, bristly in several series, and separated in the centre by a naked interval; under the lens, they appear pyramidal, acute and recurved. Tongue broad, reddish, covered to its margin with numerous patches of card teeth; in the centre, a distinct oval cartilaginous patch, with teeth somewhat more robust. Similar teeth on the upper jaw, palatines and pharyngeals; the latter somewhat longer. Lower jaw longest.

Anterior to the dorsal fin are eight distinct equidistant triangular spines, 0·2 in height, and about 0·5 apart; the posterior spine nearly concealed in the flesh of the dorsal. The dorsal fin is very long, elevated and triangular in front, and, after the thirteenth ray, nearly of equal height to the end; the third and fourth rays are longest: this fin commences midway between the base of the pectoral and the origin of the anal fin, and terminates above the end of this latter fin. Pectoral fins five inches long, falciform, composed of twenty rays; the first spinous: a strong fold of skin behind this fin. Ventrals short, broad and pointed, with one subspinous and five branched rays. The anal fin resembles the dorsal in shape, but its rays

are not so long; it begins opposite the eighth or ninth ray of the dorsal. Caudal deeply lunate, its upper lobe longest, and its rays projecting beyond the membrane.

The liver and stomach very large; the latter dilated, with a short appendix. It was filled with the half digested remains of several fish, among which a species of *Pleuronectes* was observed. Two large sacs above the stomach, communicated with an aperture behind the vent.

Color. All above black; on the sides, near the lateral line, lighter. Beneath this, a distinctly separated longitudinal band of a slate color, extending from the pectoral fin to the tail, and through its lower lobe. The parts beneath silvery white.

Length, 32·0. Of head, 5·0.
Fin rays, D. 8.34; P. 20; V. 1.5; A. 23; C. 21.

The Crab-eater, from which the above description is taken, was exceedingly voracious. He was captured in a seine in the harbor of Boston, and placed in a car with other fish. It was soon discovered that he had destroyed and eaten every fish in the car. They were chiefly the Big Porgee, *P. argyrops*. It is a rare and probably a solitary fish.

Its geographic range is very great, and it is found equally on the coasts of Africa and America. On our coast it ranges from 42° north to the shores of Brazil. It occurs on the coast of South-Carolina, as I find a drawing of it among the illustrations of the ichthyology of that State by my friend Dr. Holbrook. It is too rare to have obtained any popular name, and I adopt that proposed by my late valued friend Dr. Mitchill. If not appropriate, it may answer for a distinctive popular name.

GENUS LICHIA. *Cuvier.*

Body compressed. The first dorsal composed of spines, each with a membrane; in front of these, a recumbent spine directed forwards. First anal fin of two spines. Sides of the tail not keeled, nor with prominent crests.

THE CAROLINA LICHIA.

LICHIA CAROLINA.

PLATE X. FIG. 30. — (CABINET OF THE LYCEUM.)

Characteristics. Body compressed; its height to its length as one to two nearly. First rays of the second dorsal and anal very long. Length one foot.

Description. Body high, compressed. Dorsal outline regularly arched. Rostrum blunt, suddenly descending in front. Scales very minute, deeply imbedded, and ascending high up on the base of the tail. Lateral line arising from the upper angle of the opercle, running nearly straight above the pectoral, then descending obliquely beyond the tips of the pectorals to the middle of the body and tail, forming a broadly flexuous curve. Length of the head to

that of the body, as one to four and a half. Orbits large. Nostrils above the plane of the upper margin of the orbits. An obtuse elevated ridge on the anterior part of the preopercle, which is corrugated in a radiating manner. Teeth so minute as scarcely to be distinguished.

The first dorsal is represented by six short distant spines, directed backwards; anterior to these, is a short acute recumbent spine, almost concealed and directed forwards. The second dorsal composed of twenty-five rays, elevated, triangular in front, low and equal behind, coterminal with the anal: the first ray is short and simple; the second and third longest, thence decreasing to the ninth; the remainder subequal. The pectoral fins consist of seventeen rays, and are broad and obtusely pointed, the sixth ray being longest. Ventrals exceedingly short, scarcely 0·8 in length, and composed of one simple and five branched rays; they are placed slightly behind the pectorals. Behind the vent are two short distant spines, representing the first anal. The anal fin similar in shape to the dorsal, and arises under its sixth ray; the first is short and simple, the third longest, thence gradually descreasing to the ninth, the remaining rays subequal. The caudal fin deeply forked, with four to six accessory rays on each side.

Color. Upper part of the head and body bluish. Gill-covers with a faint flesh-color mingling with the yellowish and silvery reflections on the sides and beneath. Pupils black; irides yellowish. Dorsals and pectoral fins dark blackish brown. Ventrals and anals yellow. Caudal fin tinged with brown and yellowish.

Length, 12·5. Of the head, 2·5. Depth at vent, 4·8.
Fin rays, D. 1.6.25; P. 27; V. 1.5; A. 2.20; C. 18 $\frac{6}{6}$.

This species is exceedingly rare on this coast, and differs widely from all the four species described by Cuvier. I find this species figured among the drawings of Dr. Holbrook, and presume, from the known distribution of its congeners, that it is more common on the coast of Carolina. I am not aware that any species of this genus has been hitherto noticed on the coast of North America. My description is drawn up from a specimen taken off Sandyhook, and prepared by Dr. Samuel G. Mott, more than twenty years since: the colors are supplied by the drawing above alluded to.

GENUS TRACHINOTUS. *Cuvier.*

Body elevated, compressed. Profile descending abruptly before the eyes. First rays of the dorsal and anal elongated. Free spines before the dorsal and anal fins.

Obs. This genus, as it now stands, comprises twenty-four species, made up from the genera *Cæsimore*, *Trachinote* and *Acanthinion* of Lacépède. They are chiefly from the North and South Atlantic and the Indian oceans.

THE SILVERY TRACHINOTE.

TRACHINOTUS ARGENTEUS.

Le Trachinote argenté, T. argenteus. Cuv. et Val. Hist. des Poiss. Vol. 8, p. 413.

Characteristics. Silvery. Height to its length as one to two. 5 – 6 dorsal spines, and one recumbent, directed forwards. Length six inches.

Description. Body elevated; its height being one-half the head and body alone, without including the lobes of the tail, which are more than one-fourth of the total length. Lateral line irregular, with five or six slight undulations. Five and sometimes six free spines on the back, without including the recumbent spine in front, nor that which adheres to the dorsal. The rays of the dorsal and anal exceed in number most of their congeners. The points of the dorsal and anal, when lying supine, reach only half the length of these fins. The limb of the preopercle with slightly elevated radiating lines, and oblique striæ on the base of the opercle. Teeth minute, equal and velvet-like. Vertebræ compressed, twenty-three. The recumbent spine is a part of the third interspinous.

Color. Silvery, with blackish at the elongated tips of the dorsal, and on the middle of the pectoral.

Length, 6·0.
Fin rays, D. 5 or 6.1.24; P. 18; V. 1.5; A. 2.1.21; C. 17 $\frac{8}{8}$.

This species was received by Cuvier from New-York and Rio Janeiro, showing a wide geographical range. Here it is so rare, that I have been compelled to adopt the description given by Cuvier.

THE SPINOUS TRACHINOTE.

TRACHINOTUS SPINOSUS.

PLATE XIX. FIG. 53.

The Spinous Dory. MITCH. Lit. and Phil. Soc. Vol. 1, pl. 6, fig. 10. (No description.)
Zeus spinosus. ID. Am. Month. Magazine, Vol. 2, p. 246.
Trachinotus fuscus? CUV. et VAL. Hist. des Poiss. Vol. 8, p. 410.

Characteristics. Body much compressed, suborbicular; olive green on the sides above; with metallic reflections beneath. Seven free spines before the dorsal, and three before the anal. Length three inches.

Description. Body exceedingly compressed; its height to its length as one to one and a half. Thickness, 0·5. Body scaleless. The lateral line moderately incurved upward, and thence straight to the tail, not concurrent with the back. Facial line broadly concave; the head projecting forward, with a blunt snout. Eyes large and silvery. Lower jaw closes within the upper; both with scarcely perceptible teeth. Branchial rays seven. Pectorals acuminate. Caudal deeply forked. Ventral rays are stated to be four, but they are probably of the normal number.

Color. Dusky greenish above; on the belly, silvery white, with clouds along the sides, and somewhat of a ruddy tint. Undulating depressions up and down the sides as in *Stromateus.*

Length, 3·0. Depth, 2·0 nearly.
Fin rays, Br. 7; D. 7.19; P. 19; V. 1.5; A. 3.19; C. 18.

This species was captured in the harbor of New-York, September, 1817, and is to be considered as an occasional visitor only from the south. Cuvier and Valenciennes, with reference merely to the plate, and not being acquainted with the text, suppose that it may possibly be their *Trachinote brun.* Their language is, "The Spinous Dory represented by "Mitchill (pl. 6, fig. 10) appears to resemble in its form very much our *T. fuscus;* but as he "does not speak of it in his text, we cannot confirm this resemblance by a comparison of "the number of rays and other circumstances which could only be explained by a verbal "description." The *T. fuscus* of Cuvier and Valenciennes is 8·0 long, brown, with conspicuous teeth; the anterior elongated rays of the dorsal and anal reach to the end of their respective fins. It is evident, from these circumstances, that our species is distinct; and finding none other approaching it, I have retained the name proposed by its original describer.

GENUS PALINURUS.

Preopercle serrated, with spines on its margin. Opercle with one or more flat spines, more or less distinctly serrated beneath. Anal with one or more spines in front. Teeth small, pointed, subequal. Body compressed, oblong. The anterior portion of the single dorsal spinous.

Obs. I propose this genus for the reception of two species from our coast, which, although allied in many particulars to the genus *Trachinotus*, differ from it in others. The anterior dorsal spines are certainly not free, and the pointed and serrated gill-covers indicate a still farther removal from that genus. The name has been applied, as I am aware, to a genus of crustacea, but is otherwise unobjectionable. Should this genus be adopted, a question arises whether it should remain in this family. As the characters of *Scombridæ* now stand, it cannot, but they will doubtless be revised by competent hands.

THE BLACK PILOT.

PALINURUS PERCIFORMIS.

PLATE XXIV. FIG. 25.—(STATE COLLECTION.)

Rudder-fish, or *Perch Coryphene*. MITCHILL, Lit. and Phil. Soc. Vol. 1, pl. 16, fig. 7. (No description.)
Coryphæna perciformis. ID. Am. Monthly Magazine, Vol. 2, p. 244.
Trachinotus argenteus. STORER, Mass. Report, p. 55. (Non Cuv.)

Characteristics. Bronze-black. The dorsal spines much lower than the soft rays. Length nine inches.

Description. Body oblong, elliptical, compressed. Height nearly equal to one-third of its length. Scales moderate, rather small, subquadrate, the free margins entire; free surface concentrically striate, plaited behind. They ascend high up on the membrane of the vertical fins, where they become very minute. The lateral line, composed of a series of short tubes, commences at the upper angle of the branchial aperture, is arched and nearly concurrent with the back, from which it is little distant. The scales containing the lateral line are notched behind, the tube being elevated in front. Head declivous, somewhat rounded. In cabinet specimens this part is subcarinate, and the supraorbital prominent, with from four to six distinct elevations. Length of the head to the margin of the opercle, 2·2. Snout blunt. Eyes large, prominent, 0·6 in diameter. Nostrils double; the posterior very large, rounded. Opercle with a pointed membrane, and a flat acute membranous spine with delicate denticulations along its rounded angle, becoming gradually effaced beneath; above this pointed membrane is a deep emargination, with a blunt spine above. Preopercle with from thirty to thirty-five subequal short spines, forming distinct ridges within the margin, and giving this bone on its outer surface a plaited and radiated appearance. Jaws subequal, the lower shutting within the upper; with a single series of small, equidistant, subequal, conic, acute, slightly recurved teeth in both.

Tongue free, flattened, thin and rounded at the tip. No teeth in the pharynx. Air-bladder large, double; the anterior portion largest.

The dorsal fin compound; the anterior portion consists of seven short, acute, triangular, spinous rays, connected with each other by a low membrane, and the whole lodged in a deep groove. The first spine is above the point of the opercle. The soft portion consists of one spinous and nineteen simple filiform rays, highest in front, and very gradually diminishing to the last ray. The pectoral fins are placed low down, 1·5 long, and composed of twenty rays; the anterior very short, with a broad accessory plate at its inner base. Ventral very slightly behind the base of the pectorals, approximated, long and pointed; the first ray short and spinous, the other branched; the second branched ray 1·4 in length, and longest. Anal fin with a fleshy base, including three spines; the first two short, nearly imbedded in the flesh; the third longest, and adpressed to the first branched ray (in the plate, these are incorrectly given). The soft rays are twenty in number, and end just posterior to the termination of the dorsal. Caudal fin deeply emarginate, with the three external rays shorter than the fourth. The scales ascend high up on the base of this fin.

Color. When freshly taken from the water, the general color of the body and fins is a bright bronze-black, with obscure reddish hues. Eyes varied with orange and yellow. Abdomen light-colored.

Length, 9·0. Of Head, 2·2. Depth, 3·0.
Fin rays, Br. 7; D. 7.1.19; P. 20; V. 1.5; A. 2.1.20; C. 21 $\frac{5}{3}$.

This fish is an occasional visitor to our shores. In 1815, several dozen of these followed a ship into the harbor of New-York, and one of them was taken by a hook at the wharves, in the month of August. It is this which is figured by Mitchill in his Memoir on the Fishes of New-York, but not accompanied with any description. On the plate it is marked *Rudder-fish* or *Perch Coryphene*, and not *C. hippuris*, as has been erroneously stated. The description was afterwards supplied by Mitchill himself, in a Supplement to his Memoir, published in the American Monthly Magazine cited above. MM. Cuvier and Valenciennes were unacquainted with this description, and from the figure alone, supposed it to be their *Trachinotus argenteus*. In this they are followed by the eminent American ichthyologist, Dr. Storer of Boston, who was equally unacquainted with Mitchill's description. Finally, Mr. I. Cozzens of New-York, to whom I am indebted for an opportunity of describing this fish, not being aware of Mitchill's description, described it in a paper read before the Lyceum some years since, as a new species, under the name of *Trachinotus cumberlandi*. On a drawing of this species found among the papers of Dr. Mitchill, which is now in the possession of Mr. Cozzens, it is labelled *Coryphena atra*, or *Black Rudder-fish*.

The specimen described above, was taken by hook near Shrewsbury inlet, in July. It appears now to be common enough to have received a popular name. Among the fishermen, it is called the *Snip-nosed Mullet*. In its stomach were found numerous shrimps, and it is represented as being exceedingly active. It has been noticed by Dr. Storer on the coast of Massachusetts.

GENUS CARANX. *Cuvier.*

Head convex, slightly sloping. Body compressed. Lateral line armed on its posterior part with bony plates.

THE SOUTHERN CARANX.

CARANX DEFENSOR.

PLATE XXIV. FIG. 72. — (STATE COLLECTION.)

Characteristics. Depth of the body one-third of the total length, much compressed. With a recumbent spine before the dorsal. No finlets. A large black spot on the opercle. Length 9 inches.

Description. Form elliptical, much compressed. Length of the head to the total length as two to nine. Scales small, ciliated on their free edges, orbicular; extending over the gill-covers, and high up on the base of the vertical fins. The lateral line curves upwards, then rather suddenly downwards to the shorter rays of the second dorsal, from which it goes off straight. On its straight portion it is furnished with twenty-five bony plates, commencing obscurely at first, but becoming more elevated, and terminating in acute triangular spines, directed backward. On the base of the tail, on each side, are two ridges or crests, obliquely directed towards each other behind. Head convex above, and slightly ridged. Opercle smooth, without scales on the greater part of its surface, with a very slight notch on its posterior margin. Nostrils double, contiguous, oblong, placed just before the orbits; the anterior closed by a valvular membrane. Eyes moderate, 0·5 in diameter, and more than their diameters apart. Teeth numerous, small, acute, hooked in both jaws; in a single series in the lower jaw; in a band of several series, of which the exterior are largest, in the upper jaw. Teeth mostly subequal, but in front of the lower jaw, often much longer than the others.

The first dorsal fin triangular, received in a furrow, and, with a short recumbent spine before it, directed forwards, and nearly concealed in the skin; the first of the seven spines which compose this fin is longest. The second dorsal arises immediately behind this, composed of one spinous and twenty branched rays; the first ray is nearly half the length of the second, which is longest; thence rapidly diminishing to the sixth, where the remainder are subequal, somewhat resembling the finlets in other genera of this family. Pectorals very long, falciform, the tips reaching the straight part of the lateral line; composed of twenty rays, of which the fourth and fifth are longest. Ventrals beneath the pectorals, small, composed of one spinous and five branched rays; the tips reach to the vent, which is an oval slit. Behind the vent are two short, stout, acute spines, connected by a membrane; these are concealed in a bony cavity, which extends to the second anal. The anal rays are seventeen; the first simple; the others branched, higher in front; the last elongated. Caudal deeply forked, (when extended, lunate,) with nineteen entire and six accessory rays.

Color. Back bluish, with a resplendent golden yellow on the sides. Ventrals, anal and caudal wax-yellow; the tips of the latter dusky. A dark round spot on the posterior margin of the opercle; another on the inner base of the pectoral, and occasionally a short black vertical bar across the middle of the pectoral fin. Dorsals brownish above. Chin satin-white. Irides golden, varied with black.

Length, 9·0. Transverse diameter, 1·2.
Fin rays, D. 7.1.20; P. 20; V. 1.5; A. 2.17; C. 19 $\frac{6}{6}$.

This is perhaps one of the most gorgeously beautiful fishes to be found in our waters. I had long considered it to be the *C. hippos* of Mitchill; but its form, absence of finlets, recumbent spine, and other particulars noticed above, render this highly improbable. They usually appear in September, if the season has been warm, and in some years are very abundant. I have rarely seen them to exceed the dimensions given above. In one of the drawings of my friend Dr. Holbrook, I notice the figure of a species which agrees entirely with mine, but which has three anal spines, and the first ray of the first dorsal is shorter than the second.

THE YELLOW CARANX.

CARANX CRYSOS.

PLATE XXVII. FIG. 85.—(STATE COLLECTION.)

The Yellow Mackerel, Scomber crysos. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 424.
La Carangue jaune. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 97.

Characteristics. Body elongated. Depth one-fourth of its total length. With a recumbent spine before the dorsal. No finlets. A very small black spot on the opercle. Length 6 to 8 inches.

Description. Body elongated, compressed. Scales small, caducous, concentrically striate, and extending over the suborbitals. Lateral line widely curved in front, and when opposite the fourth ray of the second dorsal, goes off straight with about forty-six spinous plates, becoming gradually wider behind, with stronger and more elevated spines, until they nearly surround the tail. Forehead arched. Eyes large. Nostrils double, approximated, obliquely oval. Lower jaw longest, with a series of minute card teeth. Asperities on the vomer and palatines. Tongue distinct, rounded; its surface covered with minute teeth. Margin of the opercle rounded.

The first dorsal fin is triangular, and in advance of it a short recumbent spine, as in the preceding species. This fin is composed of eight spinous rays; the first short, slender, and closely attached to the second, which is shorter than the third; the fourth longest, and all received into a deep furrow. The second dorsal is composed of twenty-five rays; has a fleshy prolongation, covering a part of the bases of more than half of the anterior rays. Its first ray is very short and spinous; the third, fourth and fifth longest, and subequal; from

these the rays rapidly diminish, and become subequal for the remainder of the fin. The pectorals are placed slightly before the ventrals, are long, falcate, and of twenty rays; the first has a short, closely applied subspinous ray; its longest ray extends to the fourth of the second dorsal fin. Ventrals in a deep cavity anterior to the commencement of the first dorsal fin, with a posterior attaching membrane. Vent a narrow slit. Anterior to the anal fin, are two long spines concealed in a furrow, the posterior with a membrane. The first three or four anal rays are long; the remainder short, subequal, with the bases of the anterior rays enveloped in a membranous sheath: the four first simple; the first short, adpressed; the second, third and fourth longest, subequal. Caudal fin deeply furcate, with two carinæ or ridges on each side, embracing the spinous lateral plates of the tail; its lobes scaly.

Color. Deep golden green and blue above, which becomes more lustrous on the gill-covers. Irides golden, mottled with brown. Sides lustrous yellow, with green reflections. A small black spot on the edge of the opercles, which are tinged with orange; this spot is occasionally wanting. Dorsals brown, tinged with yellow, and translucent at their bases. Caudal fin olive-brown at the base, yellow in the middle, and tipped with blackish brown. Pectorals faint yellow. Ventrals and anal fin golden yellow.

Length, 8·5. Depth, 2.
Fin rays, D. 8.1.24; P. 20; V. 1.5; A. 2.1.20; C. 19 $\frac{4}{4}$.

This species may readily be distinguished from the preceding, by its more elongated form. It is a very voracious animal; for in the stomach of one, I found a fish more than half of its own size. It occurs here in great abundance in September and October, and is much esteemed. It is called *Yellow Mackerel.*

THE SPOTTED CARANX.

CARANX PUNCTATUS.

PLATE LXXIII. FIG. 233.

The Hippos Mackerel. MITCH. Lit. and Phil. Soc. N. Y. pl. 5, fig. 5.
Scomber hippos. ID. Am. Monthly Magazine, Vol. 2, p. 246.
Le Caranx ponctué, Caranx punctatus. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 38.

Characteristics. Cylindrical, with a single finlet behind the dorsal and anal fins. Anterior portion of the lateral line punctate. Length 6 – 8 inches.

Description. Body cylindrical, tapering. Scales large and deciduous on the back, small and adherent on the head and neck. Teeth so minute as only to be distinguished by the touch. Lateral line curved as in the preceding, with its posterior portion armed with about forty wide and contiguous plates, with their points directed backwards; the points becoming more distinct towards the tail. Eyes large and silvery.

The first dorsal fin triangular, and of eight rays; at a short interval beyond is the second dorsal, of one spinous and thirty-one flexible rays. A finlet or spurious fin between this fin

and the base of the caudal. Pectorals one-sixth of the whole length, and with nineteen rays. Anal fin long and low, with two spines before it. Caudal deeply forked.

Color. Greenish blue on the back; yellowish along the lateral line, and on the caudal fin; silvery white on the throat, and belly whitish. A smutty oblong spot under each eye, and a dark spot on the margin of the opercle. Dorsals brownish. About twelve black points along the unarmed portion of the lateral line.

Length, 8·0 – 8. Depth, 2·0.
Fin rays, D. 10.7.21 + i; P. 19; V. 5; A. 2.9.25 + i; C. 19, according to Mitchill.
D. 8.1.31 + i; P. —; V. 1.5; A. 2.1.27 + i; C. —, according to Cuvier.

M. Cuvier supposes his *C. punctatus* to be identical with the fish figured by Mitchill under the erroneous name of *S. hippos*. He declares the figure of Mitchill to be a perfect resemblance of his species. I have given a copy of this figure. If they are identical, we must suppose great carelessness in the description given by Mitchill in his enumeration of the fin rays. It has a range from the Caribbean sea to New-York.

GENUS BLEPHARIS. *Cuvier.*

Small and nearly concealed spines in advance of the dorsal fin. Anterior rays of the dorsal and anal fin prolonged into very long filaments. Ventrals elongated. Body much compressed, trenchant, with a rapidly declivous front.

THE HAIR-FINNED BLEPHARIS.

BLEPHARIS CRINITUS.

PLATE XXV. FIG. 76.

Zeus crinitus, Hair-finned Dory. AKERLY, Am. Jour. Sc. &c. Vol. 11, p. 144, plate.

Characteristics. Body almost orbicular, not trapezoidal. Bluish above; white beneath. Length 5 to 6 inches.

Description. Body much compressed, acute on its edges, with a brilliant skin not covered with scales. Lateral line unarmed, with a broad curve about the pectoral fins, and thence straight to the tail. Eyes very large. Suborbital finely serrate. Teeth in both jaws, minute and acute; the lower jaw projecting. Dorsal fin with seven filamentous and eleven bifid rays; the first ray twelve inches long, the other six successively shorter, the bifid portion low and subequal. Pectorals falciform, and composed of seventeen rays. Ventrals long, narrow and pointed. Anal fin with five filamentous rays, varying from 4 to 6 inches in length; the remaining eleven rays low, subequal. Caudal deeply furcate.

Color. Bluish above, shining white beneath.

Length, 5·5. Depth, 3·8.
Fin rays, D. 18; P. 17; V. —; A. 16; C. —.

I have no doubt but that this species must be referred to the genus *Blepharis* of Cuvier, the low spines before the dorsal and anal having escaped the attention of Dr. Akerly. It appears closely allied to the *B. sutor* of Cuvier (Vol. 9, p. 161, pl. 253), but differs from it in its outline and proportions. Its congeners are called *Shoemakers* (*Cordonniers*) among the French colonists in the Antilles, in allusion to the filamentous rays, which are thought to resemble wax-ends. This species must be rare on our coast, as the individual described above, which was obtained from Long-Island sound, is the only one that has been observed.

GENUS ARGYREIOSUS. *Lacépède, Cuvier.*

Spines between the dorsals. Dorsal, ventral and anal rays filamentous. Body deep and much compressed, as in the preceding genus.

THE ROSTRATED ARGYREIOSE.

ARGYREIOSUS VOMER.

PLATE LXV. FIG. 238.

Zeus vomer. LINNEUS.
Argyreiosus vomer. LACEPEDE.
Z. rostratus, Rostrated Dory. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 384, pl. 2, fig. 1.
L'Abacatuia, A. vomer. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 177, pl. 255.

Characteristics. One ray of the first dorsal elongated into a filament. The anterior rays of the second dorsal elongated, but not filamentous. Length three to six inches.

Description. Facial line oblique in front; horizontal from the nape to the second dorsal fin. Snout prominent, projecting. Mouth small; lower jaw longest. Nostrils approximated, one slightly above the other. Tail exceedingly slender. Skin satin-like, without scales. Lateral line forming a semicircle in front.

First dorsal fin with three protuberances in front of it; its first ray a short spine; the next elongated into a thread half the length of the body, and sometimes twice its length; the ensuing spines very short: the first four are connected by membrane; then follow four free spines. The second dorsal, with its first ray, very short and spinous; the next long, reaching to the middle of the caudal; the remaining twenty-two decrease rapidly to the fifth, when they become short and subequal. Pectorals long, falciform. Spine of the ventrals short; the other rays filamentous, and reaching to the middle of the anal fin. Between these and the anal are two small separated spines. Anal resembles the second dorsal in shape, with one simple and nineteen branched rays; the first of the branched rays elongated. Caudal deeply forked.

Color. Lustrous silvery. Dorsal and ventral filaments blackish.

Length, 3·0 – 6·0.

Fin rays, 1st D. 1.4.4; 2d D. 1.22; P. 17; V. 1.5; A. 2.1.18; C. 17.

Cuvier has received the above species from New-York, and is positive that it is identical with the *Z. vomer* of Linneus.

THE HAIR-FINNED ARGYREIOSE.

ARGYREIOSUS CAPILLARIS.

PLATE XXVII. FIG. 82.—(STATE COLLECTION.)

Hair-finned Dory, Zeus capillaris. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 383, pl. 2, fig. 2.

Characteristics. The second and third rays of the first dorsal, and the anterior rays of the second dorsal, filamentous. Length 4½ inches.

Description. The vertical and longitudinal diameters nearly equal, and the oblique facial line nearly parallel with the base of the anal, which gives a somewhat rhomboidal figure to the outline of the fish. The surface is covered with a smooth lustrous skin, in which occur granulations, more particularly towards the tail. Lateral line scaly, rising with an abrupt irregular curve over the pectorals, and then proceeding straight to the tail. Nostrils double, oblique, one above the other, and in a line with the pupil of the eye. Facial profile acute, descending at an angle of 60°, until it arrives at a point vertical to the eye, when it proceeds at an angle of about 15° to the first dorsal; on this part are three rounded protuberances. Lower jaw longest, ascending with a distinct chin, and with minute asperities on the lower jaw. Upper jaw with similar asperities on its inner edge. Opercle smooth, and furnished with a lustrous silvery membrane. Several branchial rays.

The first dorsal fin commences above the base of the pectorals, with a short spine closely applied to the succeeding ray, which is produced into a black filament three inches long, the third ray also ending in a filament an inch and a half long; the last is simply spinous, and about 0·2 long. Between this and the second dorsal are four low sharp recumbent spines, concealed in a furrow, and not connected with the first dorsal fin. These spines are apparently isolated, but are in fact connected with each other by a low membrane. At a short interval, but unconnected with it, commences the second, or what might be termed a third dorsal fin: first ray short and spinous; the second filamentous, two inches long, and bifid at the tip; the next filamentous, and one and a half inches long; the succeeding one also filamentous, and one inch in length; the remainder branched, and counting from the seventh ray, are subequal. Pectorals falciform; the fifth ray longest, and reaching to the straight portion of the lateral line. Ventrals extend to the fourteenth ray of the anal fin, with the vent immediately behind them. Between the vent and the anal fin are two broad triangular spines. The first ray of the anal short, spinous, with a tooth on its base directed forward. The first two or three rays of the anal fin prolonged into filaments one and a half inches long; the remaining rays branched, subequal. Caudal deeply forked.

Color. Nearly uniform, lustrous, silvery. Back bright plumbeous, or slate color. Dorsal and ventral filaments black; those of the anal yellowish. Caudal light yellow, darker at the base.

Length, 4·5. Depth, 2·5.
Fin rays, D. 1.3.4.1.22; P. 18; V. 1.5; A. 2.1.19; C. 17 $\frac{4}{4}$.

In the Memoir on the fishes of New-York, by Dr. Mitchill, he describes or figures four species under the name of *Zeus*. One of them is only figured under the name of *Spinous Dory*. As no description accompanied it, Cuvier, from an inspection of the figure alone, supposes it to be closely allied to, if not identical with, his *Trachinotus fuscus*. I have described it as the *T. spinosus*. The next *Zeus*, we arrange under *Vomer;* the third is the *Argyreiosus vomer;* and the last is the *A. capillaris*, the one now described. Dr. Mitchill evidently supposed this to be the fish described under that name by Bloch, which, however, belongs to another genus. In speaking of the species now under consideration, Cuvier and Valenciennes observe, "Nous n'oserions affirmer si ce deuxième filament (de la première "dorsale) lui donne un caractère spécifique suffisant." We are disposed, however, from the other characters detailed above, to consider it specifically distinct, although closely allied to the preceding. As the same specific name is applied by Bloch and Mitchill, it might be questioned whether the name given by the latter should not be changed; and in a catalogue which I drew up some years since, I had named it *A. mitchilli*. As they belong, however, to different genera, there appears to be no necessity for making the change. The practice of naming species after individuals has led to so many abuses, that it is gradually becoming relinquished among the best continental writers.

This beautiful and strangely shaped fish appears in our waters, but in very inconsiderable numbers, about the latter end of August, when it is captured in gill-nets. I cannot, from experience, say whether it is a very palatable article of food, but its congener is said to be excellent.

GENUS VOMER. *Cuvier.*

Body compressed as in the preceding. No filaments or prolongations of the fins. Profile nearly vertical.

THE BLUNT-NOSED SHINER.

VOMER BROWNII.

PLATE XXV. FIG. 78. — (STATE COLLECTION.)

Zeus setapinnis, Bristly Dory. MITCH. Lit. and Phil. Soc. Vol. 1, p. 384, pl. 1, fig. 9.
Vomer de Brown, V. brownii. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 237.

Characteristics. Lustrous silvery. Ventrals very small. All the vertical rays short. Length 8 inches.

Description. Body strongly compressed. Tail small, cylindrical. Back carinate, horizontal, abruptly descending above the eye, and forming a concave profile. Upper part of the body above the lateral line, and a short distance beneath is destitute of scales. The sides beneath with small orbicular scales, becoming larger on the tail. Lateral line abruptly curved to a point opposite the ninth ray of the second dorsal, where it goes off straight. On the sides of the tail, it is covered with slightly elevated plates. Eyes large, and nearly on a line with the base of the pectoral fins. Nostrils double, oval, approximate, and near the edge of the forehead. Mouth slightly protractile; lower jaw longest. Teeth to be felt only on the jaws, and a narrow transverse rough band on the fore part of the vomer. Tongue pointed, black at the tip, with a rough band on its centre. Branchial rays seven.

The first dorsal composed of short and apparently isolated rays, so deeply hidden in a groove as to be scarcely visible. When elevated, there are found to be seven unequal spines, connected together by a very thin membrane. The second dorsal commences above the third ray of the anal; the second and third longest; the first short, spinous: it is coterminal with the anal, and consists of one short spine and twenty-two branched rays. The pectoral fins long, falciform, and composed of one short and spinous, and eighteen articulated rays; the fifth ray longest, and reaches to the thirteenth ray of the second dorsal. Ventrals beneath the pectorals, not quite two-tenths of an inch long, and composed of one spinous and three other rays. There are two concealed spines before the anal fin, but these I have occasionally found wanting. Anal fin with one spinous, and eighteen short subequal branched rays. Caudal deeply forked. Air-bladder very large, with two horns behind. Stomach cylindrical, with numerous cæca.

Color. The whole body of a lustrous silvery tint, passing into leaden on the back. Irides yellow. Membrane of the second dorsal minutely punctate with black, tinged at its base with light yellow. Pectorals olive-green, verging to dusky.

Length, 8·0. Height, 3·5. Thickness, 0·75.
Fin rays, D. 7.1.23; P. 1.18; V. 1.3; A. 1.18; C. 16 $\frac{7}{7}$.

This fish, so remarkable for its bizarre figure and lustrous tints, is more common on our coast than any of the four preceding species. A native of the tropical seas, its geographical range is so great as almost to entitle it to be considered a cosmopolite. It is found on both sides of the Atlantic, and even in the Pacific on the coast of Peru. New-York is probably the limit of its northern range on this side of the Atlantic. It is esteemed for food, and appears in our waters in July and August. It is found occasionally one foot long.

GENUS SERIOLA. *Cuvier* and *Valenciennes*.

Lateral lines with scales, not larger than on the rest of the body. First dorsal fin with a continuous membrane. No finlets.

THE BANDED SERIOLE.

SERIOLA ZONATA.

PLATE IX. FIG. 26.

Scomber zonatus, Banded Mackerel. MITCH. Lit. and Phil. p. 427, pl. 4, fig. 3.
La Sériole à ceintures, S. zonata. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 213.

Characteristics. Bluish green. Six broad vertical brownish bands over the body and tail. Length seven to ten inches.

Description. Body fusiform, subcompressed. Back slightly carinate. Scales small, granular, with concentric striæ. Lateral line curved, not concurrent with the back, and forming a distinct ridge on each side of the tail. Nostrils double, vertically oval, adjacent, and nearly equidistant between the snout and the eyes. Numerous incurved card-like teeth in both jaws; in the upper jaw, a small edentate space in front. A longitudinal band of fine asperities on the tongue; an arrow-shaped patch of fine bristly teeth on the vomer, and similar teeth on the palatines and pharyngeals.

The first dorsal fin spinous, subtriangular, lower than the second, and situated above the ventrals; the fourth ray longest, the last two scarcely appearing above the skin. The second dorsal slightly excavated on its upper margin, with its third and fourth rays highest. Pectorals short and broad, of nineteen rays. Ventrals long, large and stout, the tip extending to the vent; its posterior margin connected to the body by a delicate membrane. Anal fin commences under the eighteenth ray of the second dorsal, and is coterminal with that fin; just anterior to the anal are two small distant spines, scarcely appearing above the skin. Caudal deeply forked. Stomach a simple sac, with numerous cæca. Air-bladder large and simple.

Color. Silvery blue on the back and sides, becoming of a faint greenish yellow (which deepens after death) on the abdomen. Five and more, usually six, broad dusky bands nearly surrounding the body and tail; another oblique band on each side, ascending from the nose through the eye to the first dorsal, and forming a sort of crescent in front. Summit of the head dark blue, leaving a lighter colored space between the eyes. Irides yellowish. A round, black spot in the larger individuals, on the side of the body above the lateral line, and opposite the foremost rays of the second dorsal. Both dorsal fins deep olive; the tips of the first four rays of the second dorsal edged with white, and the bases of the last rays of this fin also white. Ventrals bright olive-green above; beneath, the rays are white. Anal olive-green, margined throughout with white; the last rays white. The colors of this fish are extremely fugacious, the belly and sides turning white a few minutes after death; the bands then extend over the dorsal and anal fins.

Length, 7·5. Depth, 2·0.
Fin rays, D. 7.1.34; P. 19; V. 6; A. 1.20; C. 15 $\frac{5}{5}$.

I have not seen many of these fish, which are usually caught in August, September and October. I have taken them by hook in Long Island sound, in company with the Big Porgee. They are exceedingly active and lively in their motions, as might indeed be inferred from their form. They are called *Rudder-fish* by the fishermen, who apply the same name to other fishes. In the specimens four inches long, the anal spines require to be dissected to make them appear. This fish, when fresh from the water, has a peculiar coppery smell.

(*EXTRA-LIMITAL.*)

S. boscii. (Cuv. et Val. Vol. 9, p. 209.) Silvery with brownish on the temples; faint striæ on the opercles. Thirty-one soft rays to the second dorsal. Length five and a half inches. *South-Carolina.*

S. fasciata. (Id. Vol. 9, p. 211.) Sixteen narrow ribbons in pairs over the body; a black transversal band from one eye to the other. Length 6½ inches. *South-Carolina.*

S. leiarchus. (Id. Vol. 9, p. 213.) Silvery; plumbeous on the back. Three black spots on the dorsal, and two on the anal. Length nine inches. *Delaware.* An juv. *S. zonatæ?*

S. cosmopolita. (Id. Vol. 9. p. 219, and pl. 74, fig. 237 of this work.) Silvery; back greenish; a black spot on the tail. Ventrals very small. D. 7.1.28; A. 2.1.27. *From the East Indies and New-York.*

GENUS TEMNODON.

Teeth on the outer row separate, flat, and lancet-shaped; inner series crowded. Velvet-like teeth on the vomer, palatines and tongue. The first dorsal fin in a furrow. Two short concealed spines before the anal. Tail unarmed.

THE BLUE-FISH.

TEMNODON SALTATOR.

PLATE XXVI. FIG. 81.

Gasterosteus saltatrix. LIN. 12 Ed. p. 421.
Pomatome skip. LACEPEDE, Vol. 4, p. 436.
Horse Mackerel, Scomber plumbeus. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 424, pl. 4. fig. 1.
Le Temnodon sauteur, Temnodon saltator. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 225, pl. 260.
Blue-fish, T. saltator. STORER, Fishes of Massachusetts, p. 57.

Characteristics. Bluish above; lighter on the sides and beneath. Length six to twelve inches.

Description. Body oblong, subcylindrical, compressed; facial outline gently sloping. Scales adherent, subquadrate, entire in some parts, faintly ciliate elsewhere; extending over the head, opercles, and high up on the fins. Lateral line nearly concurrent with the back. Eyes large, one and a half diameters from the nose. Nostrils double, approximate; the anterior round, the posterior a vertical slit. Lower jaw longest, with from ten to twelve lancet-shaped distant teeth on each side; these teeth are minutely crenate on their edges. The upper jaw slightly protractile, with from twenty-five to thirty similar shaped teeth; and behind these another series, in front of very small teeth. Card-like teeth on the palatines, disposed in three groups; one anterior and triangular, the two others oblong. Tongue distinct, smooth, with a frenum; on its base are two long parallel patches of recurved card-like teeth. Opercle rounded, with two indistinct flat points; interopercle ciliate. Behind the symphisis of the chin, are two large cavities.

The first dorsal fin commences five and a half inches from the end of the nose, and is composed of seven delicate flexible spinous rays, all capable of being received into a deep fissure; the eighth ray, noticed by Cuvier, has escaped my observation. At an interval of an inch commences the second dorsal, which is high, and covered with a very thick membrane on its anterior portion; it is composed of one short and twenty-five longer rays. Pectorals large, slightly anterior to the ventrals, with a scaly plate covering the outside of its base. Ventrals with one short spinous, and five branched rays; the membrane from the last ray extends far back, and unites with that of the opposite side. The anal fin, in size, shape and structure, resembles the second dorsal: it commences a little behind the origin of that fin, and extends the same distance behind its termination. There are two very short spines, concealed under the skin, before the first short spinous ray. Caudal deeply forked, with its base and some of its rays covered with minute scales.

Color. Of the head and upper part of the body, bluish, or rather plumbeous; sides and beneath with a mixture of light green. Irides brilliant yellow. Pectorals, second dorsal and caudal fin, greenish brown. Ventrals and anal fin white, tinged with blue.

Length, 17·0. Depth, 4.
Fin rays, D. 7.1.25; P. 17; V. 1.5; A. 1.27; C. 19 $\frac{2}{2}$.

The *Blue-fish*, or, as it is sometimes called, the *Horse Mackerel*, *Green-fish* in Virginia, and *Skip-jack* in Carolina, is a common inhabitant of our waters from May until late in the autumn. They are readily caught with a hook, baited with any bright-colored substance. They are highly esteemed as food, but lose much of their flavor shortly after they are drawn from the water. They are usually of the size indicated on the plate, though the specimen which furnished the above description was much larger. I have seen them weighing twenty pounds, and have been assured by credible persons that they have been taken of the weight of thirty-five pounds.

The young, from four to six inches long, abound at the mouths of rivers and smaller streams; at that time, their whole aspect is uniform silvery, except on the summit of the back and head, which in particular lights are bluish green; they have, also, a light greenish spot inside of the base of the pectoral. From the avidity with which they seize even an unbaited hook, they have received at that age the name of *Snapping Mackerel*. Like many others of this family, they are exceedingly erratic, and occasionally appear upon the coast of New-York in great numbers. Such was the case in the summer of 1841, when they abounded in all the harbors, creeks and inlets, and ascended up the Hudson river as far as the Highlands, where many of the young were captured.

The appearance and disappearance of the Blue-fish at irregular intervals on our coast, appears to be a well established fact. Previous to the year 1764, "a large fat fish, called the "*Blue-fish*, twenty of which would fill a barrel," had been "taken in great quantities on the "coast of Massachusetts. In the year above mentioned, they all disappeared; and up to "the year 1792, they had not again made their appearance." This is the substance of a statement in the Massachusetts Historical Collections, cited by Dr. Storer. A few stragglers were noticed on the same coast about the year 1820; but ten years later, had greatly increased, and are now very numerous. On the coast of New-York, similar facts have been observed, but our records are not so definite nor minute. They were unknown upon our coast until about the year 1810, when a few appeared. In 1817, Dr. Mitchill speaks of them as being numerous about the wharves of the city; but it was not until 1825, that they became so numerous and sizable as to be an object of attention to anglers and fishermen. With the gradual appearance of this fish, was the equally gradual disappearance of the *Weak-fish*, which we have before noticed. It has been questioned whether "the blue-fish," on the coast of Massachusetts, cited above, was identical with our *Temnodon*. Either the barrels previous to 1764 were much smaller than at the present day, or the fish then were of a larger average size than we find them now; or some other species, which is no longer found on our coast,

must have been intended. Old fishermen assure me that previous to the arrival of the Blue-fish on our coast, there were great numbers of a fish very different in appearance, much larger, exceedingly voracious, and from his general color also called the *Blue-fish*. None of these, they say, are now seen on the coast. Schœpff, who wrote a memoir on the fishes of North America, and more especially of the New-York waters, in 1788, states (p. 166), "The Blue-" fish of Rhode Island belongs to the genus of Perches, if indeed it is not in reality the above " described Black-fish." This above described fish is our Sea Bass, or *Centropristes nigricans*, which, it will be recollected, is also called *Blue-fish*.

Cuvier, with his usual sagacity, has disentangled the synonimes of this fish; but as it would have little interest to the American ichthyologist, it would be needless to repeat it here. It may, however, be observed, that the first figure and description was given by Catesby, and are equally insignificant.

The Blue-fish has a very extensive geographic range, having been found on the coasts of Brazil, of New-Holland, Madagascar, Amboyna, and in the Mediterranean along the coast of Egypt. On this side of the Atlantic, they range from Brazil to Cape Cod on the coast of Massachusetts.

GENUS CORYPHÆNA. *Cuvier.*

Head compressed, trenchant; its profile elliptical or rounded. Eyes near the angle of the mouth. Ventrals thoracic. Scales small. Dorsal fin single, commencing at the nape, where it is usually most elevated, and extending along the back nearly to the tail.

Obs. This genus, first established by Linneus, but subsequently remodelled and restricted by Cuvier, comprises about thirteen species, all closely resembling each other. They are all distinguished by the brilliancy of their color, and the varying hues which they assume while dying. They are called the *Sailor's Dolphin*, to distinguish them from a species of Delphinus or Porpoise which is also called *Dolphin*, and which is, for the sake of distinction, called the *Dolphin of the ancients*, being the dolphin alluded to by the ancient poets.

THE BOTTLE-HEADED DOLPHIN.

CORYPHÆNA GLOBICEPS.

PLATE X. FIG. 29.

Common Coryphene, C. hippuris. MITCHILL, Lit. and Phil. Trans. N. Y. Vol. 1, p. 378.

Characteristics. Head prominent, rounded, and much compressed above. Length of the lobes of the caudal to the whole length, as 1 to 4·8. Length forty-two inches.

Description. Body compressed, lamelliform, elongated. Height of the body at the pectorals to its total length, as 1 to 4·8; at the tail, as 1 to 20. Length of the head one sixth

of the total length. Height of the head at the nape to its length, as 9 to 7. The upper part of the head strongly compressed, trenchant, and becoming wider at the extremity of the upper jaw. The facial line ascends in front almost vertically, being slightly concave above the jaw for the distance of about two inches. Scales deeply imbedded on the body and preopercle, and extend high up on the caudal fin: they have the same form and variety of configuration as in the *Lampugus* hereafter described, and differ from them only in being much larger; those on the base of the tail are, however, much larger in this species. The lateral line commences as usual, first slightly descending, almost immediately ascending, and forming a small curve above the pectorals, and then proceeds in a slightly wavering line through the centre of the body to the tail. Nostrils double, contiguous; the posterior largest, and both above the superior margin of the orbit; they are rather nearer to the jaw, than to a point vertical to the centre of the eye. Eyes large; diameter of the orbit, 1·2; its lower margin distant 3·5 from the gill rays beneath, and 4·5 from the crest of the nape. Lower jaw slightly advanced, and both furnished with small conic recurved teeth arranged in cards; on the anterior part of the jaw, the external series largest; similar teeth on the vomer, palatines and tongue.

The dorsal fin commences directly over the eye; the first four rays are short; the seventh and eighth longest, and rather more than half the depth of the body at the pectorals, or to be more exact, the highest ray is 5·5 long; from this ray, it diminishes almost imperceptibly to the tail. The whole length of this fin is 28·0, and it comprises sixty-three rays. The anal fin commences under the fortieth dorsal ray; the two first rays are short, the third and fourth longest: this fin terminates a short distance beyond the end of the dorsal, and contains twenty-nine rays, the highest of which are two and a half inches long. Pectoral fins small, acute, falciform, with twenty-one rays, the longest of which is five and a half inches long. Ventral fins similar to the last in shape and size, with a connecting membrane at the base, attached to the whole length of the last ray: this fin is situated behind the pectorals, with very much flattened and robust rays. Caudal fin deeply forked, and composed of nineteen complete rays, and six or seven accessories on each side; its longest rays exceed nine inches, and the margin terminates in filaments like baleen or whalebone.

Color. I have little to say in regard to the color of this species. It has been described to me as similar to the appearance exhibited in the figure.

Length, 45·0. Depth at the pectorals, 9·0.
Fin rays, D. 63; P. 21; V. 7; A. 29; C. 19 $\frac{6}{7}$.

This beautiful species was captured off the harbor of New-York, and presented to the Lyceum of Natural History in 182–. It was treated by Dr. Mitchill as the *C. hippuris*, noticed in his memoir on the fishes of New-York. It is obviously distinct from the *hippuris*, but bears a general resemblance to the *S. sueri* of Cuvier and Valenciennes. The slight indications given by the authors of that species are, however, insufficient to establish their identity. The proportional height and length of the dorsal leads me to suppose that they are specifically

distinct. In many respects, our specimen agrees with *C. equisetis*, but the figure (pl. 267), exhibits a different species. Under these circumstances, I shall, until another opportunity presents itself of examining a more recent specimen, consider it as hitherto undescribed.

(*EXTRA-LIMITAL.*)

C. sueri. (Cuv. et Val. Vol. 9, p. 302.) Height of the anterior rays of the dorsal to its length, as one to seven and a half. Dorsal fin with sixty-four, and anal with twenty-six rays. Length three feet. *Coast of the United States.*

GENUS LAMPUGUS. *Cuvier.*

Head not terminating in a rounded crest above. Dorsal subequal throughout its length, not elevated in front.

Obs. This genus was first clearly indicated by Cuvier, from *Coryphæna*, with which it is otherwise closely allied.

THE SPOTTED LAMPUGUS.

Lampugus punctulatus.

PLATE XI. FIG. 31. — (CABINET OF THE LYCEUM.)

Le Lampuge ponctué, L. punctulatus. Cuv. et Val. Hist. des Poiss. Vol. 9, p. 327.

Characteristics. The last ten or twelve rays of the dorsal somewhat elevated. A series of rounded distant blackish dots along the base of the dorsal; others irregularly distributed on the sides. Length two feet.

Description. Body elongate, compressed. Length of the head rather less than one-eighth of the total length. Height of the body at the pectorals one-eighth, and at the base of the caudal one-twentieth of the total length. Its facial outline slightly and equally curved from the origin of the dorsal to the point of the upper jaw. Scales small, oblong, deeply imbedded; largest at the posterior end, and gradually attenuated at their radical margin (see figure). The free extremity rounded, with deeply impressed concentric striæ. Lateral line waving irregularly above the pectorals, thence straight. Several series of long acute spicular scales along the anterior part of the dorsal fin (see fig.); these scales have concentric impressions on their posterior extremities, and are 0·25 long, with their greatest diameter 0·04. Eyes large; the orbits 0·7 in diameter, and rather more than their diameters distant from the point of the jaw. Nostrils double, adjacent; the posterior largest, with a valvular membrane on its anterior margin; a similar membrane on the hinder part of the anterior nostril. Jaws nearly equal, with numerous acute minute recurved teeth in broad patches; the external row largest.

Similar but smaller ones on the vomer and palatines, and exceedingly minute ones on the tongue. Seven branchial rays.

The dorsal fin long and subequal, composed of fifty-three rays, the posterior third in a slight furrow. It commences on the nape, just posterior to the orbits, and reaches to within half an inch of the base of the caudal fin; the ten or twelve last rays rise somewhat higher than the five or six preceding ones, and pass slightly beyond the membrane. The membranous slips on the tips of the rays, when the fin is supine, resemble the finlets or spurious fins on the mackerel. The pectoral fins small, triangular, falcate, and placed beneath the ninth dorsal ray; its longest ray is two inches in length. The ventral fins are long and pointed, with the third and longest ray two and a half inches. The anal fin long and low, subequal, its middle rays shorter; it commences below a point nearly equidistant between the posterior margin of the orbits, and the base of the caudal: it contains twenty-five rays. Caudal fin deeply furcate; the lobes three and a half inches long, with four accessory rays on each side.

Color. Sea-green above the lateral line; silvery on the sides, with metallic reflections on the opercles. Pupil black; irides yellowish. Dark reddish brown stripes across the head; a series of distant rounded spots along the base of the dorsal fin; a few scattering ones on the back part of the head, and confused series of similar spots on the sides below the lateral line. Dorsal, pectorals and ventral brown; anal and caudal fins light-colored.

Length, 24·0. Of the head, 3·2. Height, 3·0.
Fin rays, D. 53; P. 20; V. 5; A. 25; C. 18 $\frac{4}{4}$.

This rare and exceedingly beautiful fish was taken several years since by Capt. Barnard, who caught it with a hook, at the light-ship off the harbor of New-York. It was presented to the Lyceum in a fresh state. From notes taken at the time, I am enabled to give the colors. I suppose it to be identical with the *punctulatus* of Cuvier and Valenciennes, notwithstanding slight discrepancies in the descriptions. Those writers had only a small cabinet specimen, thirteen or fourteen inches long, and their description is very succinct.

The Spotted Lampugus is a tropical species, and its farthest northern range hitherto discovered is the latitude of New-York.

GENUS RHOMBUS. *Lacépède.*

Head and body compressed. Body covered with minute scales. A small trenchant and pointed blade before the vent; a horizontal partially concealed spine before the dorsal and anal fins.

Obs. This genus had been named *Peprilus* by Cuvier in the second edition of his *Règne Animal;* the prior name of *Rhombus*, given to it by Lacépède, having escaped his notice. This compels us to change the name of Rhombus among the Pleuronectidæ. It contains five species, all from the shores of America.

THE LONG-FINNED HARVEST-FISH.

RHOMBUS LONGIPINNIS.

PLATE LXXV. FIG. 239.

Chetodon alepidotus. Lin. Syst. Nat.
Harvest-fish, Stromateus longipinnis. Mitchill, Lit. and Phil. Soc. Vol. 1, p. 366.
Peprilus alepidotus. Cuvier, Règne Animal, 2d Edition.
Rhombus longipinnis, Le Rhombe à longue nageoires. Cuv. et Val. Hist. des Poiss. Vol. 9, p. 401, pl. 274.

Characteristics. Anterior rays of the dorsal and anal fins more than half the length of their respective bases. Length seven inches.

Description. Form oval. Head and body much compressed; the facial line descends with a curve, which becomes slightly concave above the eyes; just anterior to the eyes, it suddenly descends, producing a blunt snout. Eyes large, nearer to the snout than to the margin of the opercle. Nostrils double, adjacent; the anterior small and round, the posterior vertically oval. Mouth small; the lower jaw, when extended, longest, but shuts within the upper. Scales small, round, and little apparent, particularly on the fins, where they are scarcely discernible; they are wanting on the opercles and the head. Lateral line with large scales; it rises with a broad curve, but is not concurrent with the back. Linneus, who had received this fish from Garden of South Carolina, not perceiving the scales, gave it the false name of *alepidotus*. On each jaw, a row of very small slender pointed teeth. Lower edge of the opercle concave. Branchial rays seven.

The dorsal fin commences posterior to the branchial aperture; the first three rays are spinous, the anterior very short, thence successively increasing to the ninth, when they again rapidly diminish to the eighteenth, after which they are short and subequal: a short spine or blade recumbent in front of this fin. Pectorals long and pointed, with twenty-three rays. The vent is placed between two spines, one directed backward, and the other a broad blade with its point directed forward in front of the anal fin; this latter fin resembles the dorsal in size and shape. Caudal deeply forked.

Color. "Silvery, with tints of blue, green, and iridescent; dusky on the head; and with "inky patches on the belly towards the tail, which in certain lights appear beautifully red "and purple: back bluish, with occasional clouds." *Mitchill.*

Length, 7·0.
Fin rays, D. 3.44; P. 23; A. 4.43; C. 19 $\frac{3}{3}$.

I have had several of these fish in my possession, but their color had vanished, and I accordingly employ the description of Mitchill. It is not as common as the succeeding, but is equally esteemed for eating. On a drawing of this species, belonging to my friend Dr. Holbrook, I find that it is named *Rudder-fish* at Charleston. As the name given by Linneus conveyed an erroneous idea, Cuvier has deemed it proper to adopt the more appropriate name given to it by Dr. Mitchill.

Its present ascertained geographical range is from South-Carolina to the coast of New-York.

THE SHORT-FINNED HARVEST-FISH.

RHOMBUS TRIACANTHUS.

PLATE XXVI. FIG. 80.

Stromateus triacanthus. PECK, Mem. Am. Acad. Vol. 2, part 2, p. 48, pl. 2, fig. 2.
S. cryptosus. MITCHILL, Report in part, &c. p. 3.
Cryptous Broad-shiner, S. id. ID. Lit. and Phil. Soc. N. Y. Vol. 1, p. 365, pl. 1, fig. 3.
Peprilus id. CUVIER, Règne animal, 2d edition.
Le Rhombe à fossettes, R. cryptosus. CUV. et VAL. Hist. des Poiss. Vol. 9, p. 408.
Three-spined Peprilus, P. triacanthus. STORER, Mass. Report, p. 60.

Characteristics. More elongated than the preceding; its anterior dorsal and anal rays slightly elevated. Length seven to nine inches.

Description. Body elliptical, much compressed; its height one-half of its length nearly. Dorsal outline forming the curve of a larger circle than in the preceding, and, like that, suddenly descending before the eyes, producing a somewhat truncated snout. Scales small, orbicular, caducous. The lateral line scaly, nearly concurrent with the back. Beside this, there is a slight depressed line not furnished with scales, proceeding from the origin of the lateral line straight through the centre of the tail; and a third similar line originating under the base of the pectorals, running nearly concurrent with the abdominal outline, and also terminating on the side of the tail: this last may be considered as the counterpart of the lateral line, but curved in an opposite direction. They are less obvious after death. Along the back, on each side of the base of the dorsal fin, is a series of round holes, the orifices of mucous ducts. From fifteen to twenty may be counted in front, but they become gradually effaced behind. They have each a slight furrow or depressed line running up to the base of the dorsal fin, and parallel with each other. Eyes large. Nostrils double; the posterior a vertical slit. A single series of minute crowded teeth in both jaws. Fine crowded teeth on the pharyngeals. Tongue large, spotted, smooth, free. In the œsophagus, which is dilated, and surrounded by two muscles of considerable size which are separated from each other, the interior is covered by long irregular bony processes, disposed in rounded patches, and opposed to each

other. This peculiarity of structure occurs in both genera of Stromateus and Rhombus, and has been described as the stomach. Vertebræ thirty-one.

The dorsal fin has three spinous and forty-five rays, of which the six first are longest, the posterior branched; before the dorsal is a recumbent spine, directed forward. Pectorals long and pointed. Anterior to this fin, is a broad acutely tipped movable spine; and before this, a broad axe-shaped moveable plate or spine (see figure), occupying the place of the ventrals. Caudal fin deeply forked.

Color. Brilliant metallic green, blue and golden. Deep blue on the back, which in the living specimen is obscurely mottled. Head and opercle golden green; belly and anal, in certain lights, giving a glistening pinkish hue. Irides bluish and white.

Length, 3·0 – 9·0.
Fin rays, D. 3.45; P. 19; A. 3.42; C. 19 $\frac{5}{5}$.

This fish is equally remarkable for the splendor of its coloring, and its excellence as an article of food; although many fishermen consider them unfit for eating, on account of the unpleasant odor which they emit when opened. They are believed to feed chiefly on marine plants. I found the œsophagus, in many which I opened, filled with pebbles about the size of a pin's head. When taken out of the water at night, I am told that they emit vivid phosphoric flashes. It has been conjectured, though upon very insufficient grounds, that this is the male of the preceding species.

Their known geographic range is at present limited. Peck described them on the coast of New-Hampshire, and Dr. Storer speaks of them as being so abundant at Cape Cod as to be used as manure. How far south of New-York they have been seen, I have no means of ascertaining; but it probably extends far to the southward, as its congener the *longipinnis*, with which it appears to be constantly associated, is extremely common on the coast of the Carolinas. This species appears with us about the first of July, and I have obtained them from fike-nets in the harbor of New-York as late as the twelfth of October.

(*EXTRA-LIMITAL.*)

Genus PTERACLIS, *Cuv.* et *Val.* Dorsal and anal fins each more than twice the height of the body, and extending from before the eyes to the caudal fin. Body elongated, compressed, and with large scales.

P. carolinus. (CUV. et VAL. Vol. 9, p. 368.) Silvery, with bluish reflections. Fourth dorsal ray longest. D. 52; A. 44. Length four inches. *Seacoast of Carolina.*

In concluding the history of this family, we have to notice a statement made by the author of a popular essay on the fishes of Massachusetts, in which he notices the common Dory of Europe, the *Zeus faber*, Lin., to have been detected in Boston bay. We are not aware that this fact is confirmed by the observations of any American naturalist.

The tenth family of TÆNIOIDÆ, or CEPOLIDÆ, has no representative on the coast of New-York.

FAMILY XI. TEUTHIDÆ.

Body compressed, ovate, oblong. Mouth small, not protractile. Teeth often dentated, and disposed in a single row in both jaws. Palate and tongue smooth. A single dorsal, usually long.

Obs. This family, which is peculiar to the warmer regions of the ocean, has been established upon a few genera, which, at the end of the last century, did not comprise more than eight or ten species. In the great work of Cuvier and Valenciennes, now in course of publication, one hundred species are enumerated. It is allied to the family Scombridæ, and might be considered as a group subordinate to that family. The species appear to be chiefly herbivorous. I am not aware that we have more than one representative of this family on the coast of New-York, although farther south we shall undoubtedly find many others.

GENUS ACANTHURUS. *Cuvier* and *Valenciennes.*

Teeth cutting and serrated. A movable spine on the side of the tail. Head deep, compressed. Eyes placed high up on the head. The skin thick, and usually covered with small scales.

THE SURGEON.

ACANTHURUS PHLEBOTOMUS.

PLATE LXXIII. FIG. 234.

Barbero. Parra, Desc. de diff. &c. p. 45, pl. 21, fig. 2.
L'Acanthure saigneur. Cuv. et Val. Hist. des Poiss. Vol. 10, p. 176.

Characteristics. Opercles deeply striated; the scapular also striated. Bluish brown. Tail nearly even. Length 6 – 12 inches.

Description. Body elliptical and compressed. Front nearly regularly curved to the snout. Mouth very small. The opercles with radiating striæ, and the scapular equally so with the humeral bone. Nostrils double, approximated, and the small posterior one very near the orbit. Scales small, rounded, extending over all the body and head, except on the opercular bones. Lateral line concurrent with, and near the dorsal outline. On each side of the tail is a strong, acute, compressed, lancet-shaped spine, narrowed at the base. This lies in a furrow, but can be elevated forwards at an angle of 45°, and become a powerful weapon. Teeth not covered by the lips, wide, compressed, serrated on their edges; from twelve to fourteen above, and about twenty below. Branchial rays five.

The dorsal fin compound, extending from above the branchial aperture nearly to the tail, and nearly subequal throughout; the first spinous ray very short. Caudal fin very slightly excavated, nearly even.

Color. Bluish brown. Pectorals partly yellow. In some specimens, there appear to be bands on the flanks.

Length, 3·0 – 12·0.
Fin rays, D. 9.24; P. 15; V. 1.5; A. 3.23; C. 16.

The above is a brief account of a species which is very common in the Caribbean sea, and a specimen of which Cuvier received from New-York. According to Parra, it is eaten. Through inadvertence, Richardson cites the *A. hepatus* among the fishes of New-York (*Faun.* Vol. 3, p. 86). Schœpff merely states that he saw this species at the Bahamas; but as he refers to Catesby, we are enabled to know that he intended the *Acanthurus cœruleus*, which occurs on the coast of Carolina; the *hepatus*, on the other hand, is only found in the waters of the East Indies. Our species is very rare, and can only be considered as a casual visitor. I am indebted to Cuvier for the description and figure.

(*EXTRA-LIMITAL.*)

A. cœruleus. (Cuv. et Val. Vol. 10, p. 179.) Bright blue throughout. Dorsal and anal streaked alternately with light and dark blue. Length four to eight inches. *Seacoast of South-Carolina, Florida.*

FAMILY XII. ATHERINIDÆ.

Mouth protractile; no notch on the upper jaw, nor tubercle on the lower. Suborbital not dentated. A broad silvery band on the side. Very small crowded teeth on the pharyngeals. The first branchial arch with long pectinations. Two dorsal fins, most commonly distant. Ventrals behind the pectorals.

Obs. This family was founded by Cuvier on the genus *Atherina* of Linneus, and is so closely associated with the *Mugilidæ*, that many ichthyologists still arrange them under that family. By others they are also placed under that family, but form a distinct section or tribe. In common with the Mugilidæ, they have two dorsals, but these are not always distant; their ventrals are usually much farther behind; nor have they the pharyngeal apparatus, nor the gizzard of that family. They have six branchial rays. The Atherinidæ as yet are all included under one genus, but it is susceptible of several subdivisions. Some years since, I arranged, from the suggestions of Cuvier, under the genus *Argyrea*, several of our American species with the following characters: Vomer and palatines smooth and perfectly edentate; maxillaries at their lower ends terminating in a point, etc. It requires, however, a careful examination and rigorous comparison of all the species, such as was not within my reach, to establish a genus which should be beyond the reach of cavil. The species of this family on the North American coast, are uniformly small. On the shores of South America, some species exist nearly two feet long.

GENUS ATHERINA. *Linneus.*

Body elongated, cylindrical, with large scales. The other characters included in those of the family.

THE DOTTED SILVERSIDE.

ATHERINA NOTATA.

PLATE XXVIII. FIG. 88.

Atherina menidia. Lacepede, Vol. 5, p. 376, (excl. synon.)
The Small Silverside, A. notata. Mitch. Lit. and Phil. Soc. Vol. 1, p. 446, pl. 4, fig. 6.
L'Atherine de Bosc, A. boscii. Cuv. et Val. Hist. des Poiss. Vol. 10, p. 465.
The Small Silverside, A. id. Storer, Massachusetts Report, p. 62.

Characteristics. Depth one-sixth of its length. Black points at the base of the anal rays. Dorsals contiguous; the second coterminal with the anal. Length three to four inches.

Description. Body elongated, cylindrical, subcompressed. Scales large, rounded; margins smooth, with concentric impressions. Lateral line straight. Head moderate, somewhat flattened above, and one-fifth of the total length. Eyes rather large, 0·2 in diameter. Jaws

very protractile; the lower somewhat longer; both armed with a single series of hooked teeth, those in front largest.

Dorsal fins two; the first triangular, with five simple rigid rays, gradually decreasing in size from the anterior ray: its position is above the vent. The second dorsal arises 0·2 behind the first, is composed of one spinous and nine articulated rays, with its upper margin slightly excavated. The pectorals long and pointed; placed high up, and extending nearly to the base of the ventral rays. Ventrals short and feeble, composed of one simple and five articulated rays. Anal fin long, with its anterior rays longest, and a broadly concave margin. Caudal fin deeply emarginate, with nineteen rays.

Color. A broad silvery band arises from the branchial aperture, and extends straight to the tail. Gill-covers and eyes silvery. Jaws margined with dusky. Body, above the broad longitudinal stripe, of a translucent sea-green color. Under the lens, each scale is marked by a convex series of dark points. A dark rounded spot at the base of each anal ray.

Length, 3·5. Of the head, 0·7. Depth, 0·6.
Fin rays, D. 5.1.9; P. 15; V. 1.5; A. 1.25; C. 19.

This is a common species in the harbor of New-York, but they do not appear to be as numerous now as they were twenty years ago, when they were caught from the wharves and sold for bait. They are known under the names of *Anchovies* and *Sand Smelts*. They are esteemed a savory food. Their present ascertained geographical range extends from South-Carolina to Cape Cod in Massachusetts. We are at a loss to know why Cuvier and Valenciennes changed the prior and appropriate name given to this species by Dr. Mitchill.

THE SLENDER SILVERSIDE.

ATHERINA MENIDIA.

PLATE LXXIV. FIG. 236.

Atherina menidia. LINN. Syst. Nat. Ed. 12mo. p. 519, (excl. syn.)
A. menidia. PECK, Massachusetts Hist. Collections, Vol. 5? p. 202.
Green-striped Silverside, A. viridescens. MITCH. Lit. and Phil. Soc. Vol. 1, p. 447. (Young and imperfect?)

Characteristics. Body long and slender. Dorsals distant; the second dorsal nearly over the middle of the anal. Length five inches.

Description. Height to its length, as one to seven. Length of the head to the total length, as one to five and a half. Summit of the head smooth and convex. The gape of the mouth extends but half of the interval between the eye and the end of the snout. Its small teeth are very evident. The pectorals to the total length are as one to seven. Anal fin two and a half times longer than the second dorsal, which is placed nearly opposite its middle portion. The longitudinal band has a bluish border above. The black points on the edge of the scales are very small, so that the fish is light-colored. This species has two ovaries. Air-bladder simple. Vertebræ forty-four. Branchial rays six.

Length five inches.
Fin rays, D. 5.1.9; P. 15; V. 1.5; A. 1.25; C. 19.

I am unacquainted with this species, and insert it on the authority of Cuvier and Valenciennes, who received it from New-York. For the figure, I have been indebted to Dr. Holbrook. It appears to be widely different from the preceding, by the distance of the dorsals apart; by the position of the second dorsal, which is far from being coterminal with the anal; by the more deeply excavated or crescent-shaped caudal, and by other particulars cited above.

I make a reference to Peck with much doubt. "This little fish," he says, "is called by "Linneus, *Atherina menidia*, pinna ani radiis 24. It is four inches long, is semitransparent, "and has a broad silvery line extending from the opening of the gills to the insertion of the "tail. The tail is forked; the iris silvery; the back is marked in diamonds by dotted lines. "It is found in great numbers in the river Piscataqua, in the months of August and Septem- "ber. It feeds on minute aquatic insects of the *monoculus* kind, and is preyed upon by "various fishes as well as by shelldrakes."

The Green Silverside, *Atherina viridescens* of Mitchill, is evidently to me a young and mutilated specimen of this species. With regard to the *Atherina mordax*, or large Silverside of the same author, there is more difficulty. From its dental armature and adipose dorsal, it cannot be arranged in this family. In his Report in part, he states that "it may be *A.* "*brownii*; if it be so considered, we shall know it better for the future." I am not acquainted with the species here referred to, but have no doubt that the *mordax* is the true *Osmerus* of the family Salmonidæ. I am disposed to believe that my late venerable friend has, by mistake, applied the description of *Osmerus eperlanus* to this species.

(*EXTRA-LIMITAL.*)

A. carolina. (Cuv. et Val. Vol. 10, p. 445.) Snout pointed. Height to its total length, as one to six and three-quarters. D. 8.1.12; A. 1.16. Length four inches. *South-Carolina.*

FAMILY XIII. MUGILIDÆ.

Opercle entire. Body covered with large scales, extending over the head, where they sometimes become polygonal plates. Two dorsals widely separate. Ventrals placed behind the pectorals. No cirrus to the lower jaw. Teeth, when present, very minute.

Obs. This family was established by Cuvier, on the genus *Mugil* of Linneus, which in his time contained two species, and those badly determined, and now comprises about sixty species arranged under five genera. They chiefly inhabit the seas of the temperate and torrid zones. The representatives of but one genus only occurs on the coast of New-York.

GENUS MUGIL. *Cuvier.*

Ventrals placed a short distance behind the pectoral fins. The first dorsal fin with four spinous rays. The middle of the under jaw tuberculated within, and a corresponding cavity in the upper jaw. Teeth very small.

Obs. The American species so closely resemble each other, that according to M. Valenciennes, it is almost impossible by words alone to express their characteristic difference. It is only by having all the species side by side, that the various proportions of the head to the body, the position of the eye in relation to the snout, and slight shades of difference in the curves of the opercular pieces, render them distinguishable from each other.

THE STRIPED MULLET.

MUGIL LINEATUS.

PLATE XV. FIG. 42. — (STATE COLLECTION.)

Mugil lineatus. MITCHILL, MSS. communication to Cuvier.
Le Muge rayé, M. lineatus. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 96.

Characteristics. Lower jaw equaling or exceeding the upper in length. Ten or twelve dark longitudinal stripes. Dorsal outline convex. Length six to eight inches.

Description. Body cylindrical; dorsal outline nearly as convex as that of the abdomen. Scales large, easily detached, rounded, truncate in front, with a triangular area at that part, marked by numerous parallel raised lines, the exposed portion rounded with concentric lines; the scales extend over the opercles, the head (where they are completely rounded) to the extremity of the snout, and some distance up the caudal rays. I could not trace the lateral line. Head smaller than in most of the species, being 1.5 in length measured to the upper part of the opercle; it is flat above, and declivous. Eyes large, with a thick membranous skin. Nostrils double, distant and small; the anterior smallest and rounded. Suborbital obtusely truncated, finely denticulated on its anterior margin and at the end. Mouth protractile, with

numerous minute acute bristly recurved teeth, loosely inserted in the gums. Lower jaw slightly pointed, with an elevated ridge over the symphisis, which is received into a corresponding cavity in the upper jaw. A transverse membranous fold on the upper jaw. Palatines with asperities in front. Tongue free, triangular, ridged in the middle.

The anterior dorsal fin commences at the distance of 3·1 from the end of the snout, and is placed in a slight depression, with an elongated scale on each side of the base; it contains four spinous rays, of which the first is longest, the last slender and delicate. The second dorsal fin larger, subquadrate, and excavated on the posterior part of its margin; composed of eight branched rays, the last longer than the three preceding. Ventral fins with axillary plates, and with a robust spinous ray equaling in length the last branched ray; these fins are placed under a point equidistant between the base of the pectorals and the first dorsal. Pectoral fins with sixteen articulated rays; the first simple, the remainder branched. Anal fin beneath the second dorsal, with three spinous and eight branched rays; the first spinous ray very short; the first and second branched rays longest, the sixth shortest, the fifth and eighth subequal. Caudal fin deeply emarginate.

Color. Purplish brown above; lighter on the sides, with ten to twelve dark brown longitudinal stripes on the sides of the body; these disappear soon after death. Head with greenish metallic reflections; sides of the head yellowish. Pupils black; irides yellowish or soiled white. A dark bluish or purplish spot at the base of the pectoral fins. Abdomen pearl-grey.

Length, 7·5.
Fin rays, D. 4.8; P. 16; V. 1.5; A. 3.8; C. 12 $\frac{4}{4}$.

This Mullet was first detected on our coast by Dr. Mitchill, who sent a specimen, with the name and a description, many years ago. They appear in our markets in the beginning of September, and are highly esteemed. The fishermen believe them to be identical with the preceding. I have seen specimens three inches long, which I suppose to be the young of this species. In these the dorsal outline is nearly straight, and the abdomen cultrate. This produces such a strongly marked variation from the original form, that if considered by itself, it might readily be taken for an undescribed species.

Its geographic limits are unknown. It is probably common along our whole southern coast, and New-York is probably its farthest northern range.

THE WHITE MULLET.

MUGIL ALBULA.

Mugil albula. LIN. Syst. Nat. Ed. 12ma, p. 520.
M. id., New-York Mullet. MITCH. Lit. and Phil. Soc. Vol. 1, p. 447.
Le Muge blanquette, M. id. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 94.

Characteristics. General hue whitish. Caudal with a blackish border. Lips finely pectinated. Length nine inches.

Description. Body almost cylindrical, tapering. Head moderate. Eyes covered with a thick membranous skin. Scales on the head and body large and rounded. Forty-two were counted in a line from the branchial aperture to the base of the caudal fin. A series of small scales on the snout, between the anterior nostrils. Lateral line indistinct or wanting. Scaly plates at the base of the pectorals and ventrals; small scales on the pectoral, ventral and caudal fins, those on the latter fin ascending high up. Mouth protractile. Lips thin, finely pectinated, with membranous slips. Jaws nearly even; the lower with a distinct prominence in the centre, within, and received into a corresponding depression in the upper jaw. Tongue ridged along the medial line, smooth, covered with large papillæ, as are the pharyngeals, but with no vestige of teeth.

The first dorsal fin placed just over the point reached by the tips of the ventrals; the second ray slightly longest. Second dorsal fin composed of one short feebly spinous, and eight articulated rays; the first two longest; the fifth, sixth and seventh short; the last equaling the fourth in length. Pectorals small and pointed, composed of one simple and fourteen branched rays. Ventrals short and broad; the first ray acutely spinous, the others very ramose. Anal fin opposite the second dorsal, which it resembles in shape and size, is composed of one short sharp spine and seven branched rays. Caudal fin deeply emarginate; its extremities ragged, and covered high up with small oblong scales.

Color. A uniform white, rather darker along the sides of the back, with a few dark-colored longitudinal stripes, which occur in many species.

Length, 9·0. Of the head, 1·8. Depth at the dorsal fin, 2·0.
Fin rays, D. 4.1.8; P. 15; V. 1.5; A. 1.7; C. 15.

Whether this be the *M. albula* of Linneus, may well be doubted. There are also discrepancies in the radial formula as given by Mitchill, Cuvier and myself, which I cannot pretend to reconcile. In all the characters given by Mitchill and myself, except in the radial formula, our specimens agree. In one particular, the pectinated lips, which are distinctly mentioned by Mitchill, do not appear to have been noticed by Cuvier and Valenciennes. This character approximates it to the *M. labes* of the Mediterranean; but in our species, the lips are not thick. It is also distantly allied to the *M. cirrostomus* of Forster, from the Pacific.

The figure of this species, as given by Catesby, (if indeed it be this species,) may well be

supposed to have been drawn from memory. The ventrals are placed under the first dorsal, and he has forgotten the pectorals altogether.

The White Mullet is in high repute among epicures. It is a plump firm fish, and appears in our markets in July and August. Dr. Mitchill speaks of one unusually large, which weighed two and a half pounds. Schœpff describes them as being very abundant on the shoal and sandy coasts of Virginia and Carolina. They appear, he says, at certain intervals in large scholes, and then are caught in great numbers and salted. Our coast is probably the extreme northerly limit of its geographic range.

THE ROCK MULLET.

MUGIL PETROSUS.

M. petrosus, Le Muge des Roches. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 88.

Characteristics. The second dorsal and anal covered with scales. No spot at the base of the pectoral. Length 6 – 7 inches.

Description. Eyelids covered with a thick mucosity. Maxillaries slender, and covered by the suborbital bones. The second dorsal and anal covered with scales. Lips thin. The edge of the caudal fin scarcely blackish.

Length, 6·0 – 7·0.

The above brief notice of this fish we extract from the *Histoire des Poissons*, where it is spoken of as a southern species. It ranges from Brazil to the coast of New-York, from which latter place the authors received specimens.

THE SPOTTED MULLET.

MUGIL PLUMIERI.

Le Muge de Plumier. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 90.

Characteristics. The second dorsal and anal without scales. Height of the body to its length, as one to four and a half nearly. Scales small.

Description. Resembles the preceding, but the body is deeper, and the head still more so. At the nape, the depth of the head is equal nearly to three-quarters of the total length. Second dorsal and anal without scales. From forty-two to forty-five scales are counted in a line from the gills to the base of the caudal fin. The skin over the eye is very thick. Suborbital truncated, and minutely dentated near its end. Lips thin. Tongue thick and rounded, with two small patches of asperities on its sides near the root. Two large plates, covered with strong asperities, on the palatines. Vomer crescent-shaped.

Color. Edges of the scales golden yellow; a blackish blue spot on the base of the pectoral, and a small spot of the same color on every scale.

MM. Cuvier and Valenciennes give no farther descriptive details of a species, which ranges from Brazil to New-York. They have received it from both places. At Martinique, according to M. Plée, it is considered scarcely fit to eat, from its insipidity.

FAMILY XIV. GOBIDÆ.

Body more or less elongated. Scales small, or entirely wanting. The spines of the dorsal fin slender and flexible. Branchial aperture small. Ventrals, when present, placed in advance of the pectorals. Many viviparous.

Obs. This family was established by Cuvier, and comprises about two hundred species, distributed among twenty-nine genera. Almost all the members of this family have such slender and flexible rays, that in one genus, *Zoarces*, many ichthyologists have hesitated whether they should not be considered as soft rays. On the other hand, in the genus *Gunnellus*, the dorsal rays become short, robust and acute spines. They all resemble each other in the conformation of their viscera; the intestinal canal is simple, nearly equal throughout, and without cæcal appendages. No air-bladder.

GENUS BLENNIUS. *Cuvier.*

Body elongated. Dorsal fin single, extending along the back, and composed of simple flexible rays. Skin smooth, and without scales. Branchial rays six. Ventral fins placed under the throat, and composed apparently of two rays; the internal one being often subdivided under the skin. The eyes, and occasionally the nape and nostrils, with filaments. Teeth stout, simple, and crowded in a single row; often ending with a long canine.

Obs. The males of this genus are recognized by rows of papillæ near the aperture of the vas deferens and the urinary bladder. The aperture of the ovaries in the females is small, and placed behind the vent and before the exit of the urinary bladder. They are not viviparous, and are of small dimensions.

THE SEA-WEED BLENNY.

BLENNIUS FUCORUM.

PLATE XXII. FIG. 66.

Le Blennie des fucus, B. fucorum. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 263, pl. 324.

Characteristics. Greenish brown, with brown spots above the lateral line. Bifid cirri over the eyes, as long as the head. Length one to two inches.

Description. Body small and scaleless; the lateral line curves broadly above the pectoral fin. Head large, and deeper than long. Eyes large and prominent, and the orbits projecting beyond the facial outline. Length of the head to the total length as one to five. A thread-shape cirrus on the upper part of each orbit, nearly as long as the head, bifid at the tip, with some fine threads at its internal base. Teeth fine, fixed and crowded; twenty-four in each jaw, and behind, on each side, above and below, a strong canine tooth.

The dorsal fin commences just behind the nape, and declines gradually to the eleventh ray; it then gently rises, and extends with nearly subequal rays almost to the caudal fin. The anal is coterminal with the dorsal, and contains eighteen or nineteen rays. Caudal rounded, with thirteen or fourteen rays.

Color. Soiled greenish, changing to brownish above, with numerous brown spots on the cheeks and sides of the body. Throat and belly faintly rosaceous. Iris bluish, with reddish points radiating about the pupils.

Length, 2·5.
Fin rays, D. 11.17; P. 14; V. 3; A. 18; C. 14.

In a voyage from Constantinople in 1831, I met with this species swimming about sea-weed, not far from the coast of New-York, and made notes of it at the time, considering it as either a young individual of some larger species, or as undescribed. My specimen was not more than an inch and a half long. It agrees so entirely with the figure and description of Cuvier, that I have no hesitation in referring it to that species. The specimen described by Cuvier and Valenciennes was taken south of the Azores.

(*EXTRA-LIMITAL.*)

B. geminatus. (WOOD. Ac. Sc. Vol. 4, p. 278.) Spotted; a black spot on the anterior part of the dorsal fin; a trifid cirrus over each eye. D. 27; P. 13; V. 2; A. 17; C. 14 $\frac{2}{3}$. Length 2 – 3 inches. *South-Carolina.*

B. punctatus. (ID. Ib. p. 279.) An irregular blackish spot between the first and third rays of the dorsal; a bifid cirrus over each eye. Body thickly covered with small blackish spots, confluent on the sides. Caudal with five obscure bands. V. 3; C. 11. Length 3 inches. *South-Carolina.*

GENUS PHOLIS. *Fleming.*

No cirri on the orbits, nor even fleshy crests.

Obs. This subdivision, first proposed by Fleming, has been adopted by Cuvier, although it is considered of little importance. In all other respects it resembles the preceding genus, from which it has been separated. It contains but few species, among which we notice on our coast

THE RADIATED SHANNY.

PHOLIS SUB-BIFURCATUS.

The Sub-bifurcated Pholis, P. sub-bifurcatus. STORER, Massachusetts Report, p. 63.

Characteristics. Dorsal extending to the tail. Filaments on the nostrils. Three dark bands passing from the eyes. Lateral line sub-bifurcated. Length 5½ inches.

Description. Length of the head to the total length as one to three. Jaws protractile, and armed with prominent sharp teeth. A minute filament over the nostril, one-third of a line in length. Lips large and fleshy. The lateral line commences just above the angle of the opercle, and having advanced two lines, sub-bifurcates; the lower branch passes down in a gradual curve a little more than a line, and goes off straight to the tail; the upper abruptly terminates opposite the fourteenth ray of the dorsal fin. Surface of the body with very minute scales.

Dorsal fin beginning on a line with the posterior angle of the opercle, is continued to the caudal fin; the first five rays shorter than the sixth; the rays become again shorter as they approach the tail. Pectorals three lines long, and are rounded. Ventrals three-rayed, with free extremities, but united during the greater part of their extent: they are placed two lines in front of the pectorals. The anal fin commences at a point midway between the tip of the snout and the extremity of the tail. Caudal fin rounded.

Color. Above reddish brown. Opercle and preopercle yellowish. Light-colored circular patches along the base of the dorsal fin; beneath the lateral line, lighter. Abdomen yellowish white. From beneath the eye, a broad black band, which is widest at its origin, crosses the opercle obliquely; two other bands of the same color extend from behind the eye backward, in nearly a straight line, to a distance of from one to two lines. Numerous black spots on the dorsal fin, which are larger on the first five rays. Pectorals light, with darker shades. Anal fin with a dark-colored margin. Caudal with small dusky spots.

Length, 5·5. Depth, 1·0.
Fin rays, D. 43; P. 13; V. 3; A. 30; C. 14.

This is a rare species. I have not had an opportunity of examining it, and am indebted to its original discoverer, Dr. Storer, for the above description. I may here observe, that I have

noticed abnormal deviations in the lateral line so frequently, that I am inclined to suspect it in the foregoing description.

This species was found among sea-weed at Nahant in Massachusetts bay, and will very probably be discovered on our coast.

(*EXTRA-LIMITAL.*)

P. carolinus. (Cuv. et Val. Vol. 11, p. 277.) Greenish, with four or five irregular spots along the back. Teeth $\frac{1}{14}$, with stout canines. D. 12. 18; A. 18. Length four inches. *Coast of South-Carolina.*

GENUS CHASMODES. *Cuvier.*

The branchial aperture open only above the pectoral fin. Mouth deeply cleft, with teeth only on the anterior part of the jaws; these are firm, regular, and in a single row.

Obs. This small group comprises at present but three species, all from the coast of the United States.

THE SIX-BANDED CHASMODES.

Chasmodes bosquianus.

PLATE XXIV. FIG. 73. — (CABINET OF THE LYCEUM.)

Blennius pholis. Mitchill, Lit. and Phil. Soc. N. Y. Vol. 1, p. 374.
Blennius hentz? Lesueur, Journ. Acad. Sc. Vol. 4, p. 363.
Le Chasmodes bosquien, C. bosquianus. Cuv. et Val. Hist. des Poiss. Vol. 11, p. 295, pl. 327.

Characteristics. Dorsal united with the caudal. A minute filament over the eye. Six vertical bands. Length three inches.

Description. Head thick; its length to the total length as one to three and a half. Mouth excessively cleft, and extending to the posterior margin of the orbits. Teeth excessively fine, and crowded together like the teeth on a fine comb, on the anterior part of the jaws; those above are blunt-pointed, and about fifty in number; those below are acute, recurved, and about the same number: no canines. The branchial rays are six, and the aperture is reduced to a small opening above the base of the pectorals. Lateral line indistinct, and obsolete behind.

The dorsal fin is equal throughout its whole length, and equals in height one-third of the depth of the body; it unites with the caudal upon one-quarter of the length of the latter fin. The dorsal fin contains twenty-nine equally flexible rays; about the seventeenth, traces of articulation are perceptible. The anal distinct from the caudal fin, with nineteen rays; it commences about the middle of the body. Ventrals two-rayed, with a filamentous termination, and are about one-sixth of the total length. Caudal fin rounded.

Color. Brown, with lighter colored clouds, forming six broad clouded vertical bands. Dorsal fin brown, with a light longitudinal band included between two darker ones. The caudal and pectoral fins brown; anal and ventral darker.

Length, 3·5.
Fin rays, D. 29; P. 14; V. 2; A. 19; C. 15.

This is a rare species. According to Mitchill, his specimen was found in an oyster. Another specimen was sent to Cuvier from New-York. The specimen in the Cabinet of the Lyceum at New-York, was obtained from the harbor.

(*EXTRA-LIMITAL.*)

C. novemlineatus. (Wood. Ac. Sc. Vol. 4, p. 280.) With nine vertical bands. Dorsal fin with an irregular blackish spot between the first and second rays; remainder of the fin clouded. D. 30; A. 20. Length three inches. *South-Carolina.*

C. quadrifasciatus. (Id. Ib. p. 282.) With four vertical bands. Dorsal not connected with the anal; circular yellow spots near the base of the anal fin. D. 27; P. 11; A. 15; C. 9. Length two and a half inches. *Maryland.*

GENUS GUNNELLUS. *Cuvier.*

Body elongated, much compressed. Head oblong. Mouth small. Teeth velvet-like, or in cards. Dorsal rays spinous throughout. Ventrals excessively small, and reduced often to a single spine.

Obs. This genus was first named *Centronotus* by Bloch, but this name has been applied by Lacépède to another group among the Scombridæ. Some English ichthyologists have continued to use the badly characterized genus *Murenoides* of Lacépède, without being aware, that while he retained the *gunnellus* of Linneus, he formed his new genus out of the *B. murenoides* of Sujef, not knowing that the two species were identical.

THE AMERICAN BUTTER-FISH.

GUNNELLUS MUCRONATUS.

PLATE XII. FIG. 36. — (STATE COLLECTION.)

Ophidium mucronatum. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 249, pl. 2, fig. 1.
Gunnellus mucronatus, Le Gonelle épineux. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 247.
Blennius (Centronotus) gunnellus. RICHARDSON, F. B. A. Fishes, Vol. 3, p. 91.
Murenoides guttata, The Spotted Gunnel. STORER, Mass. Report, p. 65.

Characteristics. Greyish, with a series of dusky oval rings along the sides. Dorsal not united to the caudal. Two short spines in place of the ventrals. Length four to seven inches.

Description. Body elongate, linear, much compressed. No scales could be detected with a strong lens; nor could I discover, in several specimens, any traces of a lateral line. Head small, subcarinate above; its length as one to nine compared with the total length. Mouth nearly vertical. Teeth acute, distant in both jaws, and a small group on the vomer; lower jaw, when extended, longest. Branchial rays six, with a large branchial aperture. Body covered with a thick coating of mucus of the consistence of butter, from which is derived its popular name.

The dorsal fin single, long, subequal, commencing above the branchial aperture, and extending nearly to the base of the caudal; is composed of a very thick membrane, supported by from seventy-five to seventy-eight sharp spinous rays. The pectorals rounded and feeble. Beneath these, and slightly in advance, are two short and sharp spines, occupying the place of ventrals. The anal fin is nearly equal throughout its whole extent, not as high as the dorsal: it approaches still nearer to the caudal than the upper vertical fin, but is not connected with it. The two anterior rays are short acute spines, the remainder soft and flexible. Caudal fin rounded.

Color. This is extremely fugacious. I was fortunate in being able to have a drawing made from a living specimen, caught near my house, on the northern coast of Long Island. The general color, as will be seen by reference to the plate, is greyish, with a series of oval vertical dusky rings along the sides. Abdomen greyish white, tinged with yellow. Irides white. Dorsal fin grey, with fourteen black vertical distant stripes. Pectorals and caudal yellow. Anal fin greenish grey, with alternate darker stripes.

Length, 4·5. Depth, 0·5.
Fin rays, ... D. 78; P. 12; V. 1; A. 2.36; C. 16 $\frac{4}{4}$.
In another specimen, D. 75; P. 11; V. 1. A. 2.40; C. 18.

This pretty little species is frequently found among rocks along the sea-shore, and in the mud. It swims with great rapidity, although its usual habit is that of creeping slowly among rocks, in which it is probably assisted by its spiny ventrals. It abounds in Robyn's reef in the harbor of New-York. The description given by Mitchill, incomplete as it is, I have reason to know, applies to our species. It resembles the *G. vulgaris* of Yarrel (Vol. 1, p. 239); but from the above description, is evidently distinct from that species. Its present known limits are from Massachusetts to New-York, but it probably ranges still farther north.

(*EXTRA-LIMITAL.*)

G. vulgaris. (Richardson, F. B. A. Fishes, Vol. 1, p. 91.) Dorsal united to the caudal fin; ten or twelve dark spots along the base of the dorsal. Length seven to twelve inches. *Northern Coast.*

GENUS ZOARCES. *Cuvier.*

Body elongated, and covered with a mucous secretion, in which are imbedded very small scales. Dorsal, anal and caudal united; no spinous rays in the dorsal, except on its posterior part. Ventrals jugular, small. Vent with a tubercle. Teeth conical; in two or three rows in front; in a single row on the sides; none on the palate or tongue. Branchial rays six.

THE THICK-LIPPED EEL-POUT.

ZOARCES ANGUILLARIS.

PLATE XVI. FIG. 45. AND VIEW OF THE MOUTH AND UNDER SIDE. — (STATE COLLECTION. CABINET OF THE LYCEUM.)

Blennius anguillaris. PECK, Mem. Am. Acad. Vol. 2, part 2, p. 46, figure.
Large-lipped Blenny, B. labrosus. MIT. Lit. and Phil. Soc. Vol. 1, p. 375, pl. 1, fig. 7.
Le Zoarces à grosses lèvres. CUV. et VAL. Hist. des Poiss. Vol. 11, p. 466, pl. 341.
Z. anguillaris, The Eel-shaped Blenny. STORER, Massachusetts Report, p. 66.

Characteristics. Dark olive-brown, varied with dusky blotches. Dorsal and anal fin margined with rufous. Length two to three feet.

Description. Body elongate, cylindrical, compressed, and tapering to the tail. Upper lip very large and fleshy, overhanging. Surface smooth and slimy; with obscure traces of a lateral line, which has a slight curve above the pectorals, and then passes off straight. Nostrils tubular, about midway between the eyes and the end of the snout. Teeth stout, conical; those behind more acute, and all with smooth points and a slight circular furrow around the base, and also furrowed longitudinally at the base. On the upper jaw, three series of teeth in front, of which those in the foremost row are largest; in the lower jaw, the internal row has four, and the intermediate row three teeth. Stout conical teeth on the pharyngeals, but none on the palate or tongue. Eyes rather moderate in proportion to the size of the fish, and about midway between the end of the snout and the origin of the dorsal fin. Branchial aperture moderate, with six rays.

The dorsal fin commences anterior to the base of the pectoral, is long and low, and unites indirectly with the caudal; it is highest in front, and very gradually diminishes posteriorly until it approaches near the tail, when it suddenly subsides, and exhibits eighteen short spinous rays, which become continuous with the caudal. Pectorals broad and rounded, of twenty rays. Ventrals very small, four-rayed. Anal fin long and low, not as high as the dorsal, composed of about one hundred and five rays, which are almost impossible to separate from the caudal. Caudal fin pointed.

Color. Olive-brown above, clouded with deeper brown. Head darker, with black blotches irregularly distributed on the side. Sides of the body with obscure dusky marks. Dorsal fin with dull distant spots; its upper margin, as well as that of the anal, dusky rufous. Pectorals tinged with orange. Irides ashen, tinged with red.

Length, 30·0.
Fin rays, D. 114.18; P. 20; V. 4; A. 105; C. 20.

From the extreme difficulty in counting the rays in this species, a great variety has arisen among different describers. According to

Peck,	D.	146; P. —; V. 3; A. 123; C.
Mitchill,	D.	125 – 8 or 9; P. 19; V. 4; A. 103; C.
Storer,	D.	120.17 or 18; P. 19; V. 2; A. 100.
Cuv. et Val.	D.	92.21.22 = 135; P. 20; V. 4; A. 110; C. 19.

I have noticed this fish most abundantly in the market in February and March. It is caught on the coast, in company with the common cod. It feeds on various marine shells, and affords a very savory food. I have employed the English name of *Eel-pout*, which is applied to its congener the *Z. viviparus*, to designate this fish. It is called, absurdly enough, by the fishermen, *Ling* and *Conger-eel*. According to Cuvier, this species has one hundred and thirty-seven vertebræ.

THE BORDERED EEL-POUT.

ZOARCES FIMBRIATUS.

PLATE XVI. FIG. 44.

The Fringed Blenny, B. ciliatus. Mitchill, Lit. and Phil. Soc. Vol. 1, p. 374, pl. 1, fig. 6.
La Zoarces frangé, Z. fimbriatus. Cuv. et Val. Hist. des Poiss. Vol. 11, p. 468.

Characteristics. Head greenish brown. Body and tail salmon-colored. Dorsal fin dark green, margined with yellowish. Length 18 – 20 inches.

Description. Form of the head and body similar to the preceding, smooth and scaleless. Teeth on the sides of the jaw, large, distant, obtusely conical, and sufficiently translucent to permit the central vascularity to be seen. In front there are two rows; the outer row consisting of five on each side, projecting outwardly; and both rows composed of smaller teeth than those on the sides. In the upper jaw, the teeth are more acute, subequal, except the two anterior, which are slightly longer; behind these is a short series of minute teeth. The pharyngeal teeth small and acute, and ranged in transverse series. Tongue broad and smooth. Branchial rays six.

The dorsal fin commences above, and slightly in advance of the ventrals; it contains ninety-five distinct rays, enveloped in a thick membrane; then follow sixteen low spines; and from thence to the tip of the pointed caudal, are twenty-six rays. As the connection between the anal and caudal is continuous (as in the preceding species), it is impossible to say where the anal terminates, or the caudal fin proper begins. The anal, counted to the extreme tip of the tail, contains one hundred and twenty-five rays. On the supposition that those rays which in other species constitute the caudal fin amount to twenty on each side, we would have for

the dorsal fin 95.16.16, and the anal 115. The pectorals broad and rounded, digitated on the margin, and composed of twenty rays; it reaches to the seventeenth ray of the dorsal. Ventrals feeble, with four delicate spines in each, enveloped in a thick membrane; these spines are 0·6 long. The vent is opposite the twenty-sixth dorsal ray, and the meatus for the urine, communicating with a bladder which is 1·3 long, is placed 0·4 behind the vent.

Color, of the head, dark brown, mixed with green, with lighter hues on the cheeks. Irides yellow. Chin and inside of the mouth flesh-colored. Sides of the body and tail pale olive or salmon-color. Abdomen faintly rosaceous. The dorsal fin dark green throughout its whole length, lighter along its base, and with a faint yellow border on its margin. Nearly one-half of the anal fin, from its commencement, is of a dark green color; the margin tipped with greenish yellow, which, about the middle, becomes the universal color of the fin. Pectorals light olive-green, becoming darker at the base.

Length, 20·0. Greatest depth, 2·0.
Fin rays, D. 95.16.16 = 127; P. 20; V. 4; A. 115; C. 20.

Except in color, I can find scarcely any differences between this and the preceding. It was first described by Dr. Mitchill, who inadvertently named it *ciliatus*. If I have enumerated aright the soft dorsal rays, a good specific character might be drawn from their number. It is invariably smaller than the other species, and is supposed by some ichthyologists to be the young. A specimen which is supposed to be the young of the Thick-lipped Eel-pout, and which resembles the one now described in its general colors, is noticed by Dr. Storer as having all its fins transparent.

Its habits, and the time of its appearance, are the same as in the preceding species.

GENUS ANARRHICAS. *Artedi.*

Head smooth, globular, with an obtuse snout. Body elongate, with minute scales. No ventral fins. Dorsal and anal distinct from the caudal fin. Teeth of two kinds: one elongated, curved and pointed; the other truncated, or abruptly rounded. Branchial rays seven.

Obs. This genus, in the proportions and form of its head, the disposition of the fins, and the thin scales imbedded in mucus, exhibits its affinity with the genus Blennius. In the preceding genus, we have seen the ventrals reduced to mere rudiments; thus marking a natural passage to the present, where they totally disappear. One species only is well determined; this inhabits the Atlantic in high northern latitudes, descending along the shores of Europe to the channel between England and France, and on the American coast, as low down as the sea-shore of the State of New-York.

THE SEA WOLF.

ANARRHICAS LUPUS.

PLATE XVI. FIG. 43.

Anarrhicas lupus. Lin. Syst. Nat.
Sea Wolf, A. id. Mitch. Am. Month. Magazine, Vol. 2, p. 242.
L'Anarrhique loup. Cuv. et Val. Hist. des Poiss. Vol. 11, p. 473, pl. 342.
Wolf-fish, A. lupus. Storer, Massachusetts Report, p. 69.

Characteristics. Leaden grey, with dusky vertical bands on the dorsal fin, extending irregularly over the sides. Length three to five feet.

Description. Form subcylindrical, slightly compressed, elongate, and tapering gradually to the tail. Body covered with a thick coating of mucus; when this is scraped away, the small orbicular scales are seen deeply imbedded in the skin, and giving it the appearance of shagreen. Profile of the head, arched from the nape. Head compressed, rounded, slightly flattened above. Nostrils small; the posterior midway between the eye and the end of the nose, with a raised margin. A circular row of pores, the termination of mucous ducts, around the orbits, about half an inch apart, and nearly at the same distance from the orbit. In the recent specimen, these pores may be seen crossing the snout, and meeting others from the opposite side. Another series commences an inch and a half behind the eyes, and at the same distance below the nape of the neck; it first curves down, but almost immediately rising to the same plane, pursues a straight course along the back an inch below the base of the dorsal fin, and becomes effaced about the middle of the body. Another series of from four to six pores obliquely on the cheeks, and a few scattering ones on the lower jaw. Eyes moderate. Branchial rays seven.

Four large projecting teeth on the intermaxillary above, diverging outward, and seven smaller acute teeth behind, conic, pointed, with large tubercles on the inner side. Nine on the vomer, with flat crowns, becoming larger behind; the last, however, small. In a large individual, the vomerine teeth were apparently consolidated into one mass. On the upper pharyngeals are sharp and recurved teeth, disposed in two series; in a large individual, they were very robust, and nine in number on each side. In the lower jaw, two large projecting teeth in front, and two others of the same size, but recurved. Three to four smaller acute irregularly disposed teeth on each side, followed by thirteen flat crowned molars disposed in a double series. Two other rows of small acute teeth, arranged in a lunate order, on the lower pharyngeals.

The dorsal fin is nearly of a uniform height throughout, extending from the nape to the caudal; the last ray lying almost in contact with the external accessory ray of the caudal fin. The dorsal fin is composed of simple rays, included in a very tough membrane; and they would scarcely be recognized as spinous, except posteriorly, where the rays pierce the skin. Pectorals broad, rounded, four inches long, and scolloped on the margin. Anal long and low, commencing about the middle of the body, and terminating near the caudal, from which, however, it is separated by a distinct interval. Caudal rounded. The duodenum is so large as to present the appearance of a double stomach. Urinary bladder very large.

Color. From a recent specimen four feet long, taken off Block island, we are enabled to state the following particulars: General color leaden grey. Eleven or twelve broad black bands on the sides, becoming indistinct towards the tail; these bands bifurcate on the middle of the body, each posterior branch anastomosing with the branch of the succeeding band or stripe, and by their union giving rise to another vertical band, which ascends on the dorsal fin: this fin, as well as the anal, bordered above with blackish. The rays of all the vertical fins black. Irides yellow. Abdomen brownish ash, tinged with pink.

Length, 30·0. Depth, 5·0.
Fin rays, D. 74; P. 20; V. 0; A. 45; C. 14 $\frac{2}{3}$.

The voracious and savage character of this fish is manifest in the formidable array of teeth with which he is provided, and by his vicious and pugnacious propensities when first drawn from the water. Marvellous tales are related of the strength and power of his jaws, but these more properly belong to the romance of Natural History. He is known under the various popular names of *Cat*, *Wolf-fish*, and *Sea Cat*. His ill-favored aspect causes him to be regarded with aversion by fishermen, but his flesh is by no means unsavory; when smoked, it is said to have somewhat the flavor of salmon. He prefers rocky coasts, and is said to spawn in May. They are not unfrequently taken off Rockaway beach, as I am informed, in company with the common cod. This I suppose to be the most extreme southerly limits yet observed. In high northern latitudes, it is said to attain to the length of six and eight feet.

GENUS GOBIUS. *Linneus.*

Ventrals joined together, forming a hollow disk, placed under the thorax. Two dorsals. Teeth velvet-like, or in cards.

Obs. This genus, restricted as it now is, contains, in the great work of Cuvier and Valenciennes, ninety species. On this coast we have only to notice

THE VARIEGATED GOBY.

GOBIUS ALEPIDOTUS.

PLATE XXIII. FIG. 70. — (CABINET OF THE LYCEUM.)

Gobius alepidotus. Bosc, Bloch, Schnieder, p. 547.
G. boscii. Lacepede, Hist. Poiss. Vol. 2, p. 555, pl. 16, fig. 1.
Variegated Goby, G. viridipallidus. Mitchill, Lit. and Phil. Soc. Vol. 1, p. 379, pl. 1, fig. 8.
Le Gobie de Bosc. Cuv. et Val. Hist. des Poiss. Vol. 12, p. 96.

Characteristics. Greenish brown, with seven vertical dusky bands. Length two to three inches.

Description. Body oblong, cylindrical, slightly compressed on the sides. Surface of the body, examined under a lens, totally destitute of scales. The lateral line not apparent. Head one-fifth of the total length, broad, and flattened behind the eyes, with a longitudinal medial groove. Eyes more oblong than round, vertical; the upper portion of their orbits nearly contiguous, and only separated by a narrow furrow. Nostrils double, and near the eyes. A bony triangular process on the summit and extremity of the upper jaw. Opercles susceptible of great dilatation. Mouth terminal, with a wide gape; the lower jaw, when opened, longest. Both jaws furnished with small pointed conical recurved teeth, thickly crowded, in many series in front, and in a single series behind; the outer row in front longest. Tongue smooth and free.

The rays of all the fins very slender and delicate. The first dorsal fin is composed of six rays, extending beyond the membrane; they are subequal, but the first and last are shortest. This fin arises 0·55 from the end of the upper jaw, and is connected by a low rayless membrane with the second. This second fin commences at a point rather nearer to the head than to the extremity of the tail; it is composed of fourteen rays, and terminates within 0·2 of the base of the caudal, with its first rays slightly shortest. Pectoral pointed, its tip reaching a point under the commencement of the second dorsal; the middle rays longest, those above and beneath successively shorter. Seventeen rays were counted, but at the base were seen the rudiments of three or four more. Ventrals funnel-shaped, with twelve or thirteen rays, the anterior being short and indistinct; the length of its longest rays, 0·2. The anal fin commences under the fourth ray of the second dorsal, and terminates within 0·3 of the base of the caudal, with eleven subequal rays. Caudal long, lanceolate, with nineteen rays. Vent with an elevated rounded tubercle behind.

Color. "Surface greenish brown, with seven or eight paler transverse bars over the body "and tail; fins dark brown, with a bluish shade" (*Mitchill*). Caudal fin with two or three curved bars.

Length, 2·0. Depth, 0·3. Breadth of the head, 0·3.
Fin rays, D. 6.14; P. 17; V. 12 or 13; A. 11; C. 19.

This species must, from the absence of scales, and its indistinctly connected dorsals, form the type of a new genus. It is with some hesitation that I have annexed the synonimes of Bosc and Lacépède, but they evidently point to this or a very closely allied species. It is found rarely in the harbor of New-York. I have seen some specimens an inch long, with the vertical bars quite indistinct. Its known geographical range is at present included between New-York and Charleston.

FAMILY XV. LOPHIDÆ.

Scales usually absent, or replaced by bony plates, or by small grains armed with spines. The two carpal bones elongated, and forming a kind of arm to support the pectoral fin. Branchial aperture round, or a vertical slit behind the pectorals. Suborbital bone wanting, except in the genus Malthæa.

Obs. The genera which now compose this family, were for a long time arranged among the cartilaginous fishes, from the apparently soft and yielding nature of their skeletons. Cuvier has, however, clearly demonstrated its fibrous structure, and established its place in the natural series of bony fishes after the family Gobidæ. In his great work, it is designated as "*Pectorales pédiculées*;" which we designate, however, under the name of *Lophidæ*, in accordance with our general system of nomenclature. It is divided into five genera, including at present about fifty species.

GENUS LOPHIUS. *Artedi, Cuvier.*

Head enormously large, broad and depressed. Mouth large, armed with slender conical teeth on the jaws, palatines, vomer and pharyngeals. Tongue smooth. Branchial rays six; branchial arches three. Dorsal fins two; the anterior rays distant, detached, forming long filaments supporting fleshy slips.

THE AMERICAN ANGLER.

LOPHIUS AMERICANUS.

PLATE XXVIII. FIG. 87.

Lophius piscator, Sea Devil. MITCHILL, Report, p. 28.
L. piscatorius. ID. Lit. and Phil. Soc. N. York, Vol. 1, p. 465.
The Angler, L. id. STORER, Mass. Report, p. 71 and 404.

Characteristics. Intermaxillary teeth smaller, and those of the vomer larger, than in the European species. Length two to three feet.

Description. Body flat, orbicular in front, elongate and attenuated behind. Head broad, depressed. Surface covered with a smooth skin. Lower jaw longest, with a series of fleshy cirri an inch long arranged along its margin, and extending as far back as the pectorals. Along the flanks there are also series of fleshy processes, extending to the base of the caudal fin. On the central portion of the upper jaw are also two rounded pendulous processes. Eyes large, vertical, longitudinally oval, with a depression between them. Supra-orbital crest prominent and tubercular.

Teeth. A single row of long slightly recurved conical unequal teeth on each side, and a double row of large teeth in the upper jaw; the lower with a single row of long acute teeth.

Very large teeth on the vomer and palatines. Two rows of teeth on each of the lower pharyngeals, which are advanced so far forward as to lead some naturalists to suppose that the teeth are placed on the tongue.

The first dorsal fin is composed of six rays, of which the three first are distant and detached, while the remainder are united by a membrane. The first isolated ray is six inches long; it rises near the margin of the upper lip, at the distance of an inch from it, and between the nostrils. On its tip, it supports a fleshy bifid slip, two inches long. (In the European species, according to Bailly, this ray is moved by twenty-two distinct muscles.) This ray is often divided down to its base: behind this, at the distance of about an inch, is a second ray (omitted by the carelessness of the engraver), and without any fleshy slip; a third arises in a line with the posterior margin of the orbits, with the rudiment of a membrane at its base. The remaining three connected rays originate behind the base of the pectorals; the first ray three inches high; the others successively shorter: the connecting membrane covers about two-thirds of the body of the rays. The second dorsal arises about two inches behind the first, and comprises twelve subequal rays. The pectorals supported on a stout pedicel; its external margin truncated, and composed of twenty-five slender rays projecting beyond the membrane. Ventrals with five soft rays, and a small spine on their external edges. The anal fin commences slightly behind the origin of the second dorsal, and contains five rays. Caudal even, slender, and composed of nine rays.

Color. Olive brown above; beneath white. Ventrals, and the posterior part of the body beneath, dusky.

Length, 30·0.
Fin rays, D. 3.3.12; P. 25; V. 1.5; A. 10; C. 9.

This is not an uncommon fish in our waters. Its monstrous form has given rise to many popular names, such as *Sea Devil*, *Fishing Frog*, *Bellows-fish*, *Angler*, *Goose-fish*, *Monk-fish*, and various others. The largest one I have seen was four feet long. They are not eaten, but are often opened by fishermen for the sake of the numerous fishes which are found in their stomachs.

This species occurs from the capes of the Delaware northwardly.

GENUS CHIRONECTES. *Cuvier.*

Head vertically compressed. Three free rays on the summit of the head. Mouth cleft more or less vertically; opening to the gill by a round aperture behind the pectorals. Tongue edentate. Intermaxillaries, lower jaw, vomer, palatines and pharyngeals with minute card teeth. Dorsal long.

Obs. This genus was first indicated by Commerson under the name of *Antennarius*, but separated from *Lophius*, and finally established in 1816 under its present name by Cuvier. This group is composed of small species, many of which are found swimming among sea-weed. MM. Cuvier and Valenciennes have described twenty-four species, beside indications of others which are not yet sufficiently determined. The species are all closely allied, and possibly varieties have been mistaken for species.

THE GIBBOUS MOUSE-FISH.

CHIRONECTES GIBBUS.

PLATE XXIV. FIG. 74. — (CABINET OF THE LYCEUM.)

The Mouse-fish, L. gibbus. MITCHILL, Lit. and Philos. Soc. Vol. 1, pl. 4, fig. 9, (no description.)
L. id., The Mouse-fish. ID. Am. Month. Mag. Vol. 2, p. 325.

Characteristics. Surface of the body granulate. Tail rounded, with concentric bars. Posterior portion of the dorsal fin rounded. Length 2 inches.

Description. Body compressed, thickest about the pectorals; greatest depth half of the total length. Body minutely granulate, and with short distant flattened filaments distributed irregularly over it. In some instances, they are replaced by small rounded elevated tubercles. The course of the lateral line is represented by a series of pores; this series is highly curved above the pectorals, descending rapidly to the middle of the body, and then going off straight to the tail. On the anterior part of the head, and between the eyes, is a cylindrical soft ray 0·25 long, covered with numerous cuticular processes; and at the base, a slender filament enlarged at its tip. Behind and above this are two other soft rays, enveloped in a common granular membrane; the summit of the first is bifid, terminating in two flattened processes. Eyes apparently very small, and near the mouth. Mouth nearly vertical, with minute teeth in the jaws. Tongue smooth. Chin and throat with numerous distant cuticular processes. Branchial aperture small and rounded underneath, and attached to the base of the pectorals.

The dorsal fin of twelve soft and feebly branched rays; longer than high, commencing over the pectorals, and coterminal with the anal. Pectorals with ten subequal rays. Ventrals before the pectorals, elongated, horizontal, contiguous, and with five rays. The anal fin commences under the eighth dorsal ray, rounded on its margin, higher than long, and composed of one simple and six bifid rays. Caudal fin expanded, much rounded, and containing but nine rays.

Color. I have never seen this species in its recent state, and therefore cite Mitchill's description: "Color pale brown, variegated along the sides with dark yellowish and ruddy, "so as to resemble some sorts of iron-stones or fractures of ferruginous earths; the deeper "dark [markings?] cross the dorsal rays obliquely and transversely, and the caudal in con- "centric curves."

Length, 2·0. Height, 1·0.
Fin rays, D. 12; P. 10; V. 5; A. 7; C. 9.

We think this species wrongly cited both by Cuvier and Storer; its radial formula differs considerably, as well as its surface and rounded tail. Neither of these authors appear to have been acquainted with Mitchill's description.

This small species has been brought to me from oyster boats, and had been caught in the harbor of New-York.

THE SMOOTH MOUSE-FISH.

CHIRONECTES LÆVIGATUS.

PLATE XXVII. FIG. 83.

C. lævigatus. CUVIER, Memoires du Museum, Vol. 3, p. 423, pl. 16, fig. 1.
Le Chironecte uni. CUV. et VAL. Hist. des Poiss. Vol. 12, p. 399.
The Smooth Chironectes, C. lævigatus. STORER, Massachusetts Report, p. 73.

Characteristics. Surface of the body smooth. Posterior portion of the dorsal longest. Color as in preceding. Size of the preceding.

Description. Surface of the body with no vestige of granules. Minute cutaneous slips beneath the jaws. The appendages on the anterior portion of the head as in the preceding. The dorsal fin with eleven rays, gradually increasing in length from the first to the last. Pectorals with eight rays extending beyond the membrane. Ventrals with five rays, of which the second and third rays are elongated. Anal elongated, and with seven rays. Caudal rounded, but not as much so as in the preceding species.

Color. Irregular blackish blotches upon a brownish ground, tinged with reddish. Small white spots irregularly distributed on the sides. Brown transverse bars across the dorsal, pectoral and caudal fins.

Length, 2·2. Depth, 1·1.
Fin rays, D. 11; P. 8; V. 5; A. 7; C. 9.

I remarked on this species but three or four of the cuticular slips, so numerous on the preceding species. The abdomen also appeared to be more tumid. The processes on the head are almost precisely like those in the preceding species; but the anterior ray is more robust, and the second appears multifid at the tip.

The geographical range of this species extends from Charleston, South-Carolina, to Boston, Massachusetts, where it has been observed by Dr. Storer.

GENUS MALTHÆA. *Cuvier.*

Dorsal single. Body with a hard and tubercular skin, and furnished with fleshy filaments. Mouth small, prominent, protractile, and placed under the snout. From beneath the snout arises a process, supported by a bony ray, and terminating in several fleshy threads.

THE SHORT-NOSED MALTHEA.

MALTHÆA NASUTA.

PLATE XXVIII. FIG. 89.—(CABINET OF THE LYCEUM.)

Lophius radiatus? MITCHILL, Am. Month. Magazine, Vol. 2, p. 326.
M. nasuta. CUV. Règne Animal.
Lophius (Malthe) cubifrons. RICHARDSON, F. B. A. Fishes, p. 103, pl. 96.
La Malthée à nez court. CUV. et VAL. Hist. Nat. des Poiss. Vol. 12, p. 452.

Characteristics. Snout short. Scaly disks flat, with a conical point in the centre. Length 6 or 7 inches.

Description. Body depressed in front, tapering and compressed from behind the pectorals. Head prominent, and apparently elevated above the jaws. Body largest across the pectoral fins. Surface covered with scaly disks, largest above, and elevated on the back into bony tubercles. Summit of the head between the eyes excavated, and descends suddenly in front of the eyes, forming a deep cavity; at the bottom of this cavity is a large duct, and near this a long process enlarged at the tip. Eyes lateral, large and circular. Nostrils anterior, and rather beneath the eyes. Mouth protractile, with minute card-like teeth on the jaws, vomer, tongue, palatines and upper pharyngeals.

The dorsal fin small, triangular, posterior to the vent, and anterior to the commencement of the anal fin; it is composed of simple rays. Pectorals composed of eleven subequal rays; the branchial aperture at the base and upper part of the elongated carpus. Ventrals anterior to the pectorals, and composed of five rays. Anal long and pointed, placed far back, and composed of four articulated rays. Caudal slightly rounded, nearly even, with nine branched rays.

Color. I could not determine the color, as it was in spirits. It appeared of a dull brown, with deeper clouds of the same color. Pectorals and caudal fins with obscure rounded spots.

Length, 7·5.
Fin rays, D. 5; P. 11; V. 5; A. 4; C. 9.

This is a rare species. It has a wide geographical range, from the Caribbean sea to the coast of Labrador. Little is known of its habits. It feeds on the smaller crustacea and univalve shells.

THE DOTTED MALTHEA.

MALTHÆA NOTATA.

La Malthée à stigmates. CUV. and VAL. Hist. des Poiss. Vol. 12, p. 453.

Characteristics. Three or four round black spots on each side of the spine, midway between the eye and branchial orifice. Length 3½ inches.

Description. Snout in its proportions resembling the preceding. Margin of the preopercle enlarged as much as in *M. vespertilio*. Scaly disks neither so numerous nor so prominent.

Length, 3·5.

This small species was sent from New-York to Cuvier. I have not met with it.

THE BAT MALTHEA.

MALTHÆA VESPERTILIO.

Diablo. PARRA, Descripcion de dif. piezas, &c. p. 5, pl. 4.
La Malthée vespertilion. CUV. et VAL. Hist. des Poiss. Vol. 12, p. 440

Characteristics. Snout elongated into a point. Skin like shagreen, with scattering long tubercles. Length 10 – 18 inches.

Description. Body flattened. Snout pointed, and about the tenth of the total length. Width at the preopercles equal to its length, which is about half of that of the body. The whole upper surface covered with a hard rough skin; beneath softer, but rough. The facial outline descends vertically to the mouth, which is small, opening vertically. Upper jaw rather longest, protractile. Teeth like shorn velvet, in a band in the jaws, vomer and palatines; asperities also on the base of the tongue. A triangular cavity in front, from which arises a filamentous process, terminating in several fleshy filaments. Subopercle very large, ending in a point, which reaches nearly to the elbow of the pectoral.

The dorsal fin is midway between the vent and anal fin, lower than the anal, and composed of four simple rays. Pectorals broad, with eleven rays. Ventrals short, with five rays difficult to be distinguished. The vent in the middle of the total length. Anal fin three times higher than long, and with four rays. Caudal fin nearly even, quite rough, and with nine rays. Numerous short filaments on the enlarged part of the body. The opaque portion of the cornea is rough, and furnished with very small tubercles on its borders.

Color. Pale greyish brown above; pale reddish beneath.

Length, 8·0 – 18·0.
Fin rays, D. 4; P. 11; V. 5; A. 4; C. 9.

I have not met with this fish on the coast of New-York; but as it is common in the Caribbean sea, and as M. Lapilaye has obtained it from the Banks of Newfoundland, we may well

presume that it exists on our shores. Dr. Mitchill has described four species of this genus in the American Monthly Magazine, under the names of *Lophius radiatus*, *aculeatus*, *prostratus* and *calico*. With the exception of the first, which is, however, doubtful, the descriptions are too vague to enable me either to point out their specific differences, or to refer them to the previously described species. They are all from the Straits of Bahama.

GENUS BATRACHUS. *Schneider, Cuvier.*

Head depressed, broader than the body. Ventrals jugular, with three rays; the first elongated. First dorsal small; second low and long. Base of the pectorals elongated. Branchial aperture small, with six rays. Subopercle as large as the opercle, and both spinous. No suborbital. Teeth on the jaws, front of the vomer and palatines.

Obs. The place of this genus is not yet completely settled. Some authors have arranged it with *Uranoscopus*, but, as Cuvier has demonstrated, upon insufficient grounds.

THE COMMON TOAD-FISH.

BATRACHUS TAU.

PLATE XXVIII. FIG. 86.

Gadus tau. Linn. Syst. Nat. Ed. 12, p. 439.
Id. Schœpff, Beobacht. Vol. 8, p. 141.
Toad-fish, Lophius bufo. Mitchill, Lit. and Phil. Soc. Vol. 1, p. 463.
Batrachoides vernullas. Lesueur, Mem. du Museum, Vol. 5, p. 157, pl. 17.
B. variegatus, var. *a*, *b*. Id. Ac. Sc. Vol. 3, p. 399 and 401.
B. variegatus, Toad-fish. Storer, Massachusetts Report, p. 74.
Le Batrachoïde tau. Cuv. et Val. Hist. des Poiss. Vol. 12, p. 478.

Characteristics. Dorsals connected; the posterior with from twenty-five to twenty-eight spines. Length 6 – 12 inches.

Description. Body thick and rounded before, attenuated and compressed behind. Head broad, depressed; its width equalling its length. Skin without scales, and, in the recent state, covered with a thick coating of mucus. The openings of mucous pores visible beneath the eyes, and over the head and body. Lateral line obsolete. Facial outline sloping. The eyes large, lateral, but with an almost vertical aspect, and nearly covered with a fleshy membrane. Opercle with three concealed spines. Numerous cirri about the head and mouth, and a series of from five to seven cirri on each side of the lower jaw. Branchial rays six, and the aperture scarcely wider than the base of the pectorals. Gape of the mouth very large, with fleshy lips. Tongue pointed, not distinct. A series of blunt pointed teeth in the lower jaw, more numerous and crowded in front. Similar but more acute teeth in the upper jaw, and still larger ones on the anterior part of the vomer, and on the palatines.

The dorsal fin long and subequal, commencing above the spines of the opercle, and extending nearly to the tail. Although described as a double dorsal, it is in fact single, with spinous and soft portions connected by a comparatively low membrane. The first portion consists of three stoutly spinous rays, of which the middle is longest; the soft portion long and low, and subequal throughout. Pectorals wide and rounded, of eighteen rays. Ventrals arise anterior to the branchial aperture, and consist of one spinous and two simple rays, enveloped in a thick, long and pointed membrane. The anal fin commences under the seventh ray of the soft portion of the dorsal, and is coterminal with that fin; its first two rays are short; the remainder longer, and subequal throughout. Caudal much rounded.

Color, of the head and body, olive-green mottled with darker green; this color, soon after death, becomes of a bright brassy hue. Irides black, surrounded by a narrow golden ring. Pectorals, ventrals and caudal fins orange; the latter with interrupted bars of brown; ventrals uniform; pectorals with two or more concentric bars of deep blackish brown, becoming obsolete towards the base. Dorsal and anal fins olive-green, tinged with reddish along the upper margin; each with from five to seven dark spots, occasionally tending towards stripes or bars. Beneath dull yellow or pale; flesh-colored under the chin.

Length, 6·0. Depth, 1·5.
Fin rays, D. 3.26; P. 18; V. 3; A. 21; C. 15.

The size here given is the usual average size. I have seen them a foot long. It is a matter of doubt with me whether this species is not identical with the following. They closely resemble each other in color, cirri, etc., and appear to differ only in the following particulars: 1. Dorsals separated, which, however, may have been produced by an accidental rupture of the membrane. 2. The number of rays. In the *variegatus*, according to Lesueur, the rays vary from twenty-one to twenty-eight; an extent of variation scarcely compatible with the idea of a single species. According to Storer, it is twenty-five. Cuvier, although he admits the species *variegatus*, leaves us to infer that Lesueur's specimen with twenty-one rays may be allied to *B. gronovii*; and that with twenty-eight rays, to the present species. He does not hesitate, however, to arrange Var. *a* and *b* of *variegatus* under *B. tau*. The Toad-fish of Storer, I also refer to the same species; the only difference I can percieve, being in the less elevated posterior portion of the dorsal rays. The apparently odd specific name of *tau*, given by Linneus, is derived from the Greek name of the letter T, such a figure being produced on the head by two elevated lines in the dried specimens.

This fish is frequently taken in our waters, but finds no favor with the fishermen, on account of its unsightly appearance; its flesh, however, when properly cooked, is well flavored. It usually lies half buried in the mud, or among seaweed; and with its capacious mouth widely extended, and aided by his sac-like opercles, either silently sucks in small marine animals, or suddenly seizes such small fish as may incautiously pass over his extended jaws.

The common toad-fish has an extensive geographical range, having been observed from Maine to the Gulf of Mexico.

THE TWO-SPINED TOAD-FISH.

BATRACHUS CELATUS.

PLATE L. FIG. 161, AND VIEWED FROM ABOVE.—(STATE COLLECTION.)

Characteristics. Opercle with two spines. Dorsal fins separate. Body mottled with dusky transverse bars. Length one inch.

Description. Head large, broad, depressed. Body compressed immediately behind the opercles. Surface smooth, scaleless; covered with a thick mucus. Head covered with numerous minute pores, forming irregular series. Lateral line distinct, and near the dorsal outline. Opercle with two acute obvious spines, placed above each other just before the posterior margin; the superior somewhat longer. Gill apertures small, not descending below the base of the pectorals. Eyes moderately large, vertical. Nostrils small, circular, patent. Mouth large, wide, with numerous minute teeth in the jaws, vomer and palatines. Two or three irregular minute cuticular processes on the anterior part of the upper jaw.

The first dorsal fin not as high as the second, with three short acute spines connected by a slender membrane, but separated by a short interval from the second, which is long, subequal, and composed of twenty-eight rays, of which the posterior are rather longer; this fin is coterminal with the anal. Pectoral fins elongate, lancet-shaped, with the middle longest, and containing eighteen rays. Ventral fins jugular, with three rays; the middle longest, and all ending in flexible filiform tips. Anal fin subequal, and of eighteen rays. Caudal fin oblong, lanceolate, with fifteen rays. The rays of all the fins are exceedingly delicate, and difficult to be distinguished.

Color. Head dark olive-brown. Body on the side greenish, pale-colored, with irregular dusky brown transverse bars, which are frequently extended through the vertical fins.

Length, 1·0.
Fin rays, D. 3.28; P. 18; V. 3; A. 23; C. 15.

This little fish, which I have never known to exceed the above dimensions, is usually found on muddy bottoms. It has frequently been brought to me, included between the two valves of an oyster. I should think it abundant in our waters, from the following circumstance: In the summer of 1824, a number of these fish were found in the streets of New-York, after a heavy shower; and many idle speculations were hazarded in the papers of the day, as to their origin. An eminent ichthyologist of that period spoke of them "as unknown to our waters, "and not described in the books of Ichthyology." "The speculation is an exceedingly curious "one, how fishes could be elevated into the atmosphere, and by what means kept alive after "they are raised." Showers of fish are not uncommon, and are susceptible of an easy solution. They are raised by whirlwinds or water-spouts; and the tenacity of life, in the species under consideration, accounts for their being found alive.

This species cannot be confounded with any other now known. From the *B. bispinis* of Bloch and Schneider, it is readily distinguished, if indeed that species is rightly placed under the present genus.

Its geographical limits are not known.

(*EXTRA-LIMITAL.*)

B. variegatus. (LESUEUR, Ac. Sc. Vol. 3, p. 398.) Second dorsal distinct, and with twenty-one rays. Laciniated processes on the jaws, eyes and opercles. Length five and a half inches. *New-Jersey.* An sp. ver.?

FAMILY XVI. LABRIDÆ.

Jaws covered by fleshy lips. Tongue and palate smooth and toothless. Three pharyngeals: two above, and one beneath; all furnished with teeth, either paved or flattened, or pointed. Body oblong, scaly. A single dorsal, with the anterior rays spinous. An air-bladder. No cæcal appendages.

Obs. This family, as established by Cuvier, comprises three hundred and fifty-one species, arranged under twenty-two genera. They appear to be most numerous in warm latitudes; for on the coast of New-York we have only the representatives of two genera, comprising a very limited number of species. Other genera will doubtless be found on the coast bordering on the Gulf of Mexico.

GENUS CTENOLABRUS. *Valenciennes.*

Body elongated, scaly. Preopercle denticulated. A band of velvet-like teeth in front, behind the conical teeth in the jaws. Three spinous rays to the anal fin.

Obs. This genus has been lately separated by M. Valenciennes from the genus *Crenilabrus*, with which it has many characters in common.

THE COMMON BERGALL.

CTENOLABRUS CERULEUS.

PLATE XXIX. FIG. 93.

Labrus, The Burgall at New-York. SCHŒPFF, Beobacht. Vol. 8, p. 155.
Tautoga cerulea, Blue-fish or Bergall. MITCHILL, Report in part, p. 24.
Labrus chogset. ID. Lit. and Phil. Soc. N. Y. Vol. 1, p. 403, pl. 3, fig. 2.
Crenilabrus burgall. STORER, Massachusetts Report, p. 78.
Le Ctenolabre chogset. CUV. et VAL. Hist. des Poiss. Vol. 13, p. 237.

Characteristics. Bluish, passing occasionally into reddish or bronze; often with obsolete dusky bars on its back. Length 6 – 12 inches.

Description. Body elongated, compressed; its depth equalling one-fourth of its length. Scales large, adherent, subquadrate, rounded on the exposed margin, with radiating impressed lines on the concealed surface; they are found on the upper part of the preopercle and on the opercle. Forty-five or six scales occur in a line from the branchial aperture to the tail, and six above and seventeen below the lateral line. Lateral line near the back, concurrent with it, and of course not much curved; descending rather suddenly opposite the termination of the dorsal fin. Head gradually sloping; the facial line slightly convex before the dorsal fin. The opercle with a large and obtusely pointed membrane. Eyes moderate. Nostrils double; the posterior open, 0.2 distant from the eye; the anterior with a valvular opening. Preopercle

finely denticulated on its posterior margin, and for a short distance along its rounded angle; beneath smooth. Mouth protractile, with fleshy lips.

Teeth. A series of sixteen to eighteen acute teeth in the upper, and from twenty to twenty-two in the lower jaw; those in front somewhat recurved. Behind these, in both jaws, are bands of smaller velvet-like teeth. In the pharynx above, the teeth are distributed in two equal patches; they are long and blunt, and contain about twenty in each group. Below these are about forty in number, of a similar size and shape, and arranged in one triangular group. Tongue free and small. A fold of membrane extends transversely across the roof of the mouth, and a similar one opposite in the lower jaw.

The dorsal fin commences with a short spine, nearly above the gill openings; the first eighteen are spinous, lower in front, and very gradually increasing in length; (in fresh specimens, there is a short fleshy filament on each spine;) the remaining ten rays branched, higher, with a rounded margin to that part of the fin, nearly coterminal with the anal fin. The pectorals are placed under the second or third dorsal ray, broad, rounded, and composed of fifteen articulated and branched rays. Ventrals just behind the pectorals, and composed of one stout short spine, and five exceedingly ramose rays. The anal fin longer than high, of three stout spinous and nine branched rays, of which the sixth and seventh are longest. Caudal short and rounded, with its base covered with scales.

Color. There is scarcely any fish whose colors are so variable as this species. In the smaller individuals, the general color is blue, more or less mixed with brown; and faint dusky transverse bars may be frequently seen. In the larger specimens, as in the one now before me, which is twelve inches long, the colors are bright and showy, a light orange-colored tint pervading the whole body. In these, also, the head and opercles are of a beautiful chocolate mixed with bright blue; the fins of a blue, more or less brilliant.

Length, 6·0 – 12·0.
Fin rays, D. 18.10; P. 15; V. 1.5; A. 3.9; C. 15 $\frac{2}{2}$.

The specific name *burgall*, which has been applied to this species on the authority of Schœpff, is erroneous. Schœpff neither indicated nor suggested any specific name, simply stating that it was called *Burgall* at New-York. The prior and better name of *ceruleus*, proposed by Mitchill in his first report, (and which appears to have escaped the notice of my learned friend M. Valenciennes,) must be adopted.

The Bergall has various popular names: *Nibbler*, from its vexatious nibbling at the bait thrown out for other fishes; *Chogset*, a name derived from the Mohegan dialect, but its purport unknown; *Bergall*, I suppose to be of Dutch origin, as its use seems to be confined to the neighborhood of New-York. It is also called *Blue-fish*, on account of its prevailing color. At Boston, it is often called *Blue Perch*; and generally among the eastern fishermen, *Cunner*, or *Conner*. This last name is applied to a Crenilabrus on the coast of Sussex and Hampshire in England, from whence I presume it was derived.

The bergall is very common on our coast. The larger fish are held in some repute, but the flesh is rather insipid and watery. Some consider the smaller ones, when skinned, as an

excellent pan fish. It is found as far as the coast of Massachusetts, and northwardly to the banks of Newfoundland. I am not aware that it is found south of Delaware bay.

THE SPOTTED BERGALL.

CTENOLABRUS UNINOTATUS.

PLATE XXIX. FIG. 90.

Le Cténolabre mouché. CUV. et VAL. Hist. des Poiss. Vol. 12, p. 239.

Characteristics. A black spot on the first two soft rays of the dorsal fin, sometimes bordered with whitish. About six irregular dusky bands across the back. Length three to five inches.

Description. Body elongated, compressed; its height to its length as one to four. Teeth more equal, smaller, and more crowded, than in the preceding. Preopercle very finely denticulated on its posterior margin; both this and the opercle covered with numerous scales. The soft portion of the dorsal fin elevated and rounded. Caudal fin more rounded than in the preceding.

Color. About six unequal short transverse dark olive bands on the back; these are very distinct at the base of the dorsal, but become effaced on the sides. Series of rusty dots along the sides. Gill-covers obscurely rayed with greenish. Bright blue on the lower jaw, ventrals, vent, and base of the anal fin. An oblong oval brownish black or black spot on the base of the two first rays of the soft portion of the dorsal fin, or on the two last rays of the spinous portion; this spot is sometimes bordered with white or light yellowish.

Length, 3·0 – 5·0.
Fin rays, D. 19.9; P. 15; V. 1.5; A. 3.10; C. 13 $\frac{4}{4}$.

The Spotted Bergall is always found in company with the preceding, and has hitherto been considered as the young of that species. They both prefer rocky shores. I am unable to state any thing in relation to its geographical distribution.

GENUS TAUTOGA. *Mitchill, Valenciennes.*

Jaws with a double row of teeth. Opercle and preopercle without spines or denticulations, and with few or no scales.

Obs. This genus was first named by Dr. Mitchill in his Report antecedent to his Memoir, and subsequently adopted and characterized by M. Valenciennes.* It comprises at present six species from the Indian ocean, the Red sea, the coast of Norway, and the shores of the United States. But one species has yet been observed on the coast of New-York.

THE NEW-YORK TAUTOG.

TAUTOGA AMERICANA.

PLATE XIV. FIG. 39. — (STATE COLLECTION.)

Labrus, Black-fish at New-York. SCHŒPFF, Beob. Vol. 8, p. 156.
L. americanus. BL. SCHN. p. 261.
Tautoga niger. MITCHILL, Report in part, p. 23.
Labrus tautoga. ID. Lit. and Phil. Soc. N. York, Vol. 1, p. 399.
The Tautog, L. Americanus. STORER, Fishes of Massachusetts, p. 76.
Le Tautogue noir. CUV. et VAL. Hist. des Poiss. Vol. 13, p. 293.

Characteristics. Bluish black, with irregular darker blotches and bands. The soft rays of the dorsal fin elevated. Scales small. Length six to eighteen inches.

Description. Body elongate, compressed, and highest just before the dorsal fin. Length of the head to the total length as one to four nearly. Frontal outline arched from the origin of the dorsal outline to the snout; the dorsal outline rather straight along the fin to the soft rays. Scales small, thin, adherent; very small on the summit of the head, and upper part of the opercle and preopercle; others on the membrane of the dorsal, anal and caudal fins. The scales on the body are plaited behind, minutely striated; exposed surface very small, minutely punctate with black. Lateral line slightly curved, and nearly concurrent with the line of the back, going off straight through the centre of the tail. Nostrils double; the posterior largest, oval, slightly in front of the orbit, and in a line with its upper plane; the anterior small and tubular. Eyes moderate, and about two diameters apart. Preopercle large, with a few scales; its angle rounded. Opercle very large, emarginated above, and with a wide membrane. Branchial rays five. Lips thick and very fleshy; the lower jaw slightly shortest. Teeth conic, robust, particularly in front; a few forming an imperfect series behind.

The dorsal fin commences nearly above the branchial aperture, and in advance of the base of the pectorals; the spinous portion low, its height about one-fifth of the depth of the body,

* "J'ai employé, à l'exemple de Mitchill, le nom qui se terminait, par une heureuse euphonie, en une désinence latine, pour "faire connaître un nouveau genre de la famille," etc. (CUV. et VAL. *Hist. Nat. des Poissons*, Vol. 13, p. 292.)

containing seventeen subequal rays, the membrane passing beyond the tips; the soft portion is about one-third of the length of the preceding part, higher and rounded, containing ten rays. The pectoral fins wide and rounded; their length equal to half the height of the body, and containing seventeen rays. The ventral fins beneath the middle of the pectorals, moderate, and composed of one spinous and five branched rays. Anal short, commencing under the fifteenth spinous ray of the dorsal, and terminates opposite the seventh or eighth soft ray of the soft portion of that fin, and equalling that fin in height. It contains three spinous and eight branched rays. Caudal fin very short, nearly even, and slightly rounded.

Color. This is remarkably varied, but the general hue is black; occasionally deep black, or bluish black with metallic reflections. Very frequently pale bluish, with irregular bands of a deeper hue. Lips, lower jaw and abdomen lighter, sometimes of a pale color, sprinkled with black points, and occasionally of the same general hue with the rest of the body. Liver voluminous; the left lobe divided into two parts each larger than the right lobe. Rectum double the size of the preceding intestine, with a thick valve at its origin. Spleen oval, large. Air-bladder very large, enlarged and emarginate before, pointed behind. Kidneys empty almost immediately into a large urinary bladder.

Length, 6·0 – 18·0.
Fin rays, D. 17.10; P. 17; V. 1.5; A. 3.8; C. 14 $\frac{2}{2}$. Vertebræ, 34.

The Common Black-fish, or *Tautog*, in the Mohegan dialect, which is also said to mean *black*, is a well known and savory fish, affording equal pleasure to the angler and the epicure. Its usual weight in the market is about two pounds. I have heard of one which weighed twenty pounds, but the largest I have seen did not exceed twelve pounds. This fish selects in preference rocky shores, feeding near the ground on small crabs and shells; he is often, however, taken on sandy bottoms. He is a wary fish, but bites firmly, and is tenacious of life when taken from the water. It is supposed by the fishermen that he lies torpid in winter, and that at this period an adventitious membrane closes over the vent. He takes the hook freely from April until late in the autumn, when he retires into deeper water.

The geographical range of the tautog is very limited, scarcely extending beyond the Capes of the Chesapeake and Massachusetts bay. According to Dr. Storer, a very few years only have passed since this species was introduced into Massachusetts bay, and it is now common along a large portion of that coast. In 1836, three smacks were constantly employed in Wellfleet harbor from April to November, in this fishery alone.

Attempts have been made to introduce this fish farther south, but with very limited success. I am informed by my friend Dr. Holbrook, that General Thomas Pinckney imported from Rhode-Island a smack load of the Tautog, and set them adrift in the harbor of Charleston, South-Carolina, where they are to be found to this day. They are still occasionally caught weighing from one to two pounds, but never in such quantities as to be brought to market.

(*EXTRA-LIMITAL.*)

Genus XIRICHTHYS, *Cuv.* et *Val.* Head and body compressed, trenchant. Head longer than high; truncated in front. A single long uniform dorsal. Teeth in a single row in the jaws; the anterior longest. Tongue and palate smooth; pharyngeals paved.

X. lineatus. (CUV. et VAL. Vol. 14, p. 50.) A milk-white spot on the sides, from which descend lines alternately pale and deep red. Cheeks with bluish lines. Fins red. Length 5 or 6 inches. *South-Carolina.*

SOFT-RAYED FISHES.

All the fin rays soft and cartilaginous, with the exception sometimes of the first in the dorsal and the first in the pectoral fins. These rays of an articulated structure, and generally more or less branched at their extremities.

ORDER II. ABDOMINAL.

The ventrals behind the pectorals, and not attached to the humeral bone.

FAMILY SILURIDÆ.

Skin naked, and covered with a mucous secretion. Head depressed, and generally enlarged, with several fleshy filaments. A second adipose dorsal often present. The intermaxillaries, suspended under the ethmoid bone, form the edge of the upper jaw. First ray of the dorsal and pectoral fins usually a strong articulated spine, with a complicated movement.

OBS. This family contains at present about three hundred species, arranged under thirty-three genera, almost all inhabiting muddy fresh-water streams and lakes. They are sluggish in their movements, and depend more upon stratagem than swiftness to seize their prey. Some of the characters assigned to the family must be received with certain modifications. In some genera, the skin is not entirely naked, for the lateral line is covered with bony plates; and in others, these plates nearly cover the whole body.

The fishes of this family are known in this country under the popular names of *Cat-fish* (or simply *Cats*), *Bull-heads*, *Bull pouts*, *Horned pouts*, etc. Their flesh is generally esteemed, but its greatest merit appears to be derived from the aids offered by the culinary art. To the ichthyologist on the sea-shore, it is meagre and tasteless.

GENUS GALEICHTHYS. *Cuvier.*

Head rounded, smooth, unarmed. Dorsal and pectoral fins long; the first ray of each roughened, and ending in filaments. An adipose dorsal. Teeth on the jaws and vomer. Branchial rays six. Mouth with from four to six barbels.

Obs. This small group, containing at present but five species, is closely allied to *Bagrus*. One is found at the Cape of Good Hope, and the others are from the coast of North and South America. They are all marine species. On the coast of New-York, I have to describe one species.

THE OCEANIC CATFISH.

GALEICHTHYS MARINUS.

PLATE XXXVII. FIG. 118. — (STATE COLLECTION.)

Bagre. PARRA, Descripcion de diferentes piezas, etc. p. 68, pl. 31, fig. 1.
The Salt-water Cat-fish, S. Marinus. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 433.
Le Galéichthe de Parra. CUV. et VAL. Hist. des Poiss. Vol. 15, p. 33.

Characteristics. Maxillary barbels not extending to the ventrals. Filament of the pectoral fin reaching to, and occasionally extending beyond, the ventrals. Caudal lunate, with pointed tips. Length one to two feet.

Description. Body cylindrical, tapering behind; its greatest depth at the origin of the first dorsal, where it is one-sixth of the total length. Skin smooth. Lateral line slightly descending from beneath the first dorsal, anterior to which it can scarcely be traced; its course is indicated by a series of slight elevations. Back slightly carinated. Head broad, flattened above, smooth, with a few scattering patches of granulations. Jaws equal, broad and rounded. A band of velvet-like teeth on each jaw, and above there is a transverse band of teeth on the vomer. Two flattened cirri or barbels 1·5 long, depend from the chin; and two, similar in shape, from the angle of the mouth, are six inches long, and extend to the pectorals. Eyes oval, and are placed above the angle of the mouth. Nostrils double, without membrane or cirrus; the anterior round, and near the lip; the posterior, oval.

The first dorsal fin high, triangular, with one bony and seven soft rays; it is placed on the anterior third of the body, slightly behind the base of the pectorals. The first ray with rough granulations in front, three inches high, but continued six inches further by a soft flattened articulated filament ending in a fine point. The second ray four inches long, with a filament, but much shorter than the first; the filament is often wanting: the following rays rapidly shorter. Second dorsal fin adipose, small, and above the anal. Pectoral fins placed low down, and with thirteen rays; the first bony, with strong dentations behind, and continues by a similar filament to that of the first dorsal fin, six inches. Ventral fins a little in advance of a point midway between the first and second dorsal fins; it is composed of six rays. Anal

under the adipose dorsal, and with twenty-three rays. Caudal deeply lunate; its tips acute, and its lobes occasionally unequal.

Color. Blue above, tinged with green; sides silvery; abdomen opaque white.

Length, 19·0.
Fin rays, D. 1.7; P. 1.12; V. 6; A. 23; C. 17.

This marine Cat-fish has a wide geographical range, having been found in the Atlantic from 23° south to 41° north latitude, along the shores of the two Americas. Its flesh has been represented to me by those who have eaten of it, as having an exquisite flavor. It is frequently abundant in Communipaw creek, on the Jersey side of the harbor of New-York. It swims frequently with its long dorsal above the surface, in the manner of sharks, and imitating those animals in voracity.

In accordance with the law of priority, I have restored the original name given by Dr. Mitchill, although unmeaning. It is not preöccupied in this genus.

GENUS ARIUS. *Cuvier.*

With the general form of the preceding, but the palatine teeth form two distinct and distant plates; rarely any on the vomer. Branchial rays five or six.

Obs. This genus, recently separated from *Bagrus*, and forming a passage to the genus *Pimelodus*, now comprises about forty species, chiefly from Asia, Africa, and the southern parts of America. They may be subdivided into those which have acute card-like teeth, and those in which they are so closely approximated and rounded as to appear paved. To the first division belongs

MILBERT'S ARIUS.

Arius milberti.

L'Arius de Milbert. Cuv. et Val. Hist. des Poiss. Vol. 15, p. 74.

Characteristics. Casque granulated all over, and not in radiating striæ. Length five to fifteen inches.

Description. Head one-fifth of the total length. Snout round; its casque granulated as far as between the eyes. A narrow slit ascends half way up the casque. The interparietal process is one-third the length of the remaining part of the head. Its base equals its length; truncated at the end by the crescent of the buckler, which is itself truncated anteriorly. The granulations are equal, distinct but not large. Front and sides of the head smooth. The humerus with a smooth skin. The prominence of the upper jaw not very great. Palatine teeth on two oval plates, nearly touching in front by a small point. The maxillary cirri or barbels extend slightly beyond the end of the opercle; the external submandibulary cirri a fourth less. The spines moderate, with feeble teeth towards the tips, both in front and

behind. Ventrals less than the pectorals; the adipose dorsal small; the upper lobe of the caudal is one-fourth longer than the lower. Five branchial rays.

Color. Brownish steel-blue, verging to blackish above; silvery beneath. Adipose dorsal blackish; the others grey or brownish. Liver yellow, of two lobes, subdivided into many smaller ones. Gall bladder small. Stomach elongated, cylindrical. Kidneys thick, and of moderate length. Air-bladder pointed behind, and supplied with thick muscles.

Fin rays, D. 1.7; P. 1.10; V. 6; A. 17; C. 15.

I am acquainted with this species only through the work of Messrs. Cuvier and Valenciennes, from which I have adopted the description. Numerous specimens were sent to Cuvier from New-York by Milbert, and from Charleston, S. C., by Dr. Holbrook. I am induced to conjecture, although it is not mentioned by Cuvier, that this species is found in salt water.

GENUS PIMELODUS. *Cuvier.*

Palate smooth, and without teeth. Barbels varying from six to eight. Casque occasionally present.

Obs. This genus, now more circumscribed than in the last edition of the Règne Animal, comprises forty-three species. Of these, ten are described from North America; but the actual number will probably be found much greater, when the species shall have been carefully examined. All the North American species hitherto known, have the casque continuous with the buckler, and are furnished with eight barbels.

THE GREAT LAKE CATFISH.

PIMELODUS NIGRICANS.

PLATE LII. FIG. 170.—(STATE COLLECTION.)

Le Pimelode noirâtre. Lesueur, Memoires du Museum, Vol. 5, p. 153, pl. 16.
The Black Pimelode, P. nigrescens? Richardson, Northern Zoology, Fishes, Vol. 3, p. 134.
Le Pimelode noirâtre. Cuv. et Val. Hist. des Poiss. Vol. 15, p. 133.

Characteristics. Large. Deep olive brown. Caudal forked. Anal fin with twenty-five or twenty-six rays. Two to four feet.

Description. Head broad and rounded. Skin smooth, glossy, scaleless, with very faint traces of a straight lateral line. In the larger specimens, a somewhat remarkable depression on the nape anterior to the dorsal. Eyes small. Orbits 0·7 in diameter, and 4·0 apart. Barbels eight; two at the anterior margin of the posterior nostrils, on the upper part of the head, small, erectile, tapering to a fine point, and exceeding an inch in length. Posterior nostrils oblong slits, equidistant between the orbits and the central part of the snout, and rather more than that distance apart. The anterior nostrils smallest, placed in a cavity with a

tubular margin, and equidistant between the posterior nostrils and the margin of the upper jaw. Sides of the upper jaw terminate in a movable accessory bone an inch long, to which is attached a long flattened filament tapering to a fine point, and six inches long; beneath this, at the angle of the jaw, is a deep cavity. On the under side of the lower jaw, at a distance of half an inch from the margin, are four cirri or barbels placed transversely: two on each side of the jaw; the two composing the middle pair rather more distant from each other, than from the adjacent cirrus on each side. All these are somewhat compressed, but less so than those at the angle of the jaw. Exterior to the outer barbels, on each side, are two or three foramina in a regular series; the two external communicating with the inside of the mouth, the others merely blind cavities. These are not always present on both sides, and sometimes they are almost obsolete. Mouth very capacious, with broad bands of small recurved equal teeth in both jaws, and in the throat. Palate smooth. Tongue large and rounded, not free.

The first dorsal fin obtusely pointed, higher than wide, and composed of one bony and six branched rays. It commences eight and a half inches from the end of the snout, or a little forward of a point reached by the tips of the pectorals. The bony ray is serrated, and terminates in a soft flexible tip; the third ray slightly longest. The adipose dorsal elongate, rounded; its tip reaching a point above the termination of the anal. Pectorals placed low down, consisting of one stout articulated and serrated spine, and of nine branched rays; the lowermost small and indistinct; the length of its base to its height as three to one. Ventrals broad and rounded, consisting of one spinous and eight broad flat many-branched rays; these fins arise nearly beneath a point reached by the tips of the prostrate dorsal. The extremities of the ventrals cover the vent and the posterior urinary meatus, which latter terminates in a fleshy tubercle. Anal fin long and subequal, composed of twenty-six rays: the first ray short; the second and third successively longer; the rest subequal as far as the twenty-second, when they again become shorter, making the posterior termination of this fin regularly rounded: its base to its height as three to one nearly. Caudal forked, with seventeen complete rays. The rays of all the fins are so much enveloped in the common thick teguments, as to be counted with difficulty. The spleen is dark red, flat and rounded, with a flat accessory lobe above. The liver large, transverse, with two lobes on the left, and a smaller one on the right; the gall-bladder is long and large, and attached closely to the substance of the liver. Stomach exceedingly thick and muscular. Kidneys large, bifurcating backwards under the air bladder, and terminating in a large urinary bladder. Air-bladder large, long, with remarkably thick coats; anteriorly it ends in two pointed processes, with a laciniated border between them; a longitudinal wall or septum, as stout as the external coat, divides it into two equal parts; the anterior part is covered by a broad thin glandular substance, the uses of which are unknown. The most curious fact in relation to the air-bladder, is that it communicates with the alimentary canal, just under the diaphragm, by a duct two inches long, and sufficiently large to admit a crow quill.

Color. General hue olive-brown; the upper part of the head and cheeks bluish; the sides of the body towards the tail, ash white, with occasionally large confluent black spots; a few irregular distant round black spots on the upper part of the body. Upper lip maculated with

black. All beneath bluish white, varied with darker. Base of the ventrals and pectorals whitish. Pupil black; irides varied with blackish and golden.

Fin rays, D. 1.6.0; P. 1.9; V. 1.8; A. 26; C. 17 $\frac{2}{2}$.

A specimen twenty-eight inches long, offered the following dimensions:

Girth over the opercles,	14·0	Length of the two lower outer pair,	3·5
— behind the pectorals,	12·0	— of the pectorals,	3·0
— around the tail,	4·0	— of the ventrals,	2·5
Length of the upper cirri,	1·3	— of the dorsal,	3·0
— of the buccal cirri,	6·0	— of the adipose fin,	1·0

Distance between the tips of the caudal fin, 6·0

This Lake Cat-fish was taken at Buffalo, and weighed eight pounds. I have seen them weighing from twenty-five to thirty pounds, and have heard of others which reached the weight of eighty pounds. It is held in very little estimation as an article of food, I should judge, from the prices asked for them in the towns along the lake. I have seen them weighing ten or twelve pounds, offered for six cents apiece. Like all its congeners, it prefers muddy bottoms. It is usually captured by the spear.

THE COMMON CATFISH.

PIMELODUS CATUS.

PLATE XXXVII. FIG. 119. — (STATE COLLECTION.)

Silurus catus. LINNEUS, Syst. Nat.
Common Fresh-water Cat-fish, S. catus. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 433.
Pimelodus nebulosus. LESUEUR, Mem. du Museum d'Histoire Naturelle. Vol. 5, p. 149.
The Horned Pout. STORER, Massachusetts Report, p. 102.
Le Pimelode nébuleux, et *Chat.* CUV. et VAL. Hist. des Poiss. Vol. 15, p. 124 and 132.

Characteristics. Dusky, becoming darker on the back and upper part of the head. Two concealed spines near the base of the pectoral. Caudal nearly even, rounded. Length six to ten inches.

Description. Body elongate, depressed before the anterior dorsal, compressed behind. Head flattened, smooth, declivous. The anterior nostril near the edge of the upper lip; the posterior nearly equidistant between the snout and the eye, with a short erect barbel on its anterior margin, and partially concealing it; these barbels, when extended backwards, pass a short distance beyond the eyes. Depending from the upper jaw are two thick fleshy barbels, which reach to the middle of the pectorals. Four filaments are placed under the lower jaw; the exterior, on each side, reach beyond the branchial aperture beneath; the two interior shorter. Body smooth, scaleless. The lateral line nearly straight, occasionally obscure. Eyes small, a short distance behind the angle of the mouth. Branchial aperture

wide, with eight branchial rays, the last almost rudimentary. Two blunt spines on the humeral bone. Upper jaw longest; both with a band of numerous, small, crowded teeth. A roughened orbicular patch on each upper pharyngeal.

The first dorsal fin commences at about one-third of the total length, higher than long, rounded above; the first ray stoutly spinous, the fourth longest. Second dorsal adipose, elongated, and placed above the termination of the anal. Pectorals small, with a serrated spine, and nine closely crowded articulated rays. This spine, like that of the dorsal, by an ingenious mechanism, becomes fixed and immovable at the will of the animal, and serves as an important arm of defence. The ventrals smaller than the pectorals, placed beneath the last ray of the dorsal, and with eight rays. Anal long and subequal; its first rays short, and partially concealed. Caudal nearly even, slightly rounded. The intestines simple, and without cæca. Vent oblong. Kidneys very large, surround the base of the air-bladder, and terminate in a large urinary bladder. Air-bladder oval or heart-shaped, and apparently simple; but when the external white fibrous coat is removed, it is found to be covered with a thin transparent membrane forming two distinct sacs, lying side by side; and each sac is again strangulated towards its anterior extremity, thus forming four distinct cavities.

Color. Dusky, with a deeper shade on the back and summit of the head. Sides of the head with a greenish tint; cupreous on the sides. Abdomen pearl-grey. Fins dusky. After death, from infiltration, some of the fins become tinged with red. Irides white.

Length, 7·5.
Fin rays, D. 1.6; P. 1.8; V. 8; A. 23; C. 19.

This is one of our most common species, and makes its appearance in market in the first days of April. A peculiarity connected with this species, and perhaps with others of the same family, is, that it occasionally appears without any ventral fins. I have seen two thus deprived of these fins, and this furnished a naturalist with an opportunity of forming a new genus *Pimapterus*. The specimens thus defective agreed in every respect to the minutest particular with the species above described, so that I am induced to conclude that it was entirely accidental. May not the genus *Astroblepus* of Humboldt (*Obs. Zool.* Vol. 1, p. 19, pl. 7), be founded on a similar mal-formation? We notice that Cuvier passed over this genus in silence in the last edition of his *Règne Animal*, although M. Valenciennes has reproduced it in his continuation of the *Histoire Naturelle des Poissons*.

The *Common Catfish*, *Horn Pout* or *Minister*, has a wide geographic range. It occurs in the great lakes, and along the Atlantic States from New-Hampshire to Florida.

THE BROWN CATFISH.

PIMELODUS PULLUS.

PLATE XXXVII. FIG. 117. — (STATE COLLECTION.)

Characteristics. Pectorals pointed. Ventrals subacute. Caudal fin emarginate. Length nine to twelve inches.

Description. Head flattened, with a granular surface above; its length compared to the total length, is as one to four and a half. The upper jaw slightly the longest. Lateral line slightly concave under the dorsal fin, and then straight. Breadth of the head slightly less than its length. Eyes small, two-tenths of an inch in diameter, and far apart. Nostrils double; the posterior pair half an inch apart, patent, oval, with an erectile cirrus on their anterior margins; the anterior pair subtubular, and near the edge of the jaws. A long cirrus, stout and fleshy at its base, at each angle of the jaws, and an inch and a half long. A pair of slender cirri 0·6 long, on the summit of the head; four others under the lower jaw, arranged in a curved line an inch in extent; the internal pair shortest, and all slender. Humeral bone with a blunt spine over the pectoral, and a short obtuse angular projection beneath. Mouth very ample and dilatable. A band of small recurved teeth in each jaw, broadest in the centre, and diminishing to a point on the sides. Vomer and palatines smooth. Two rounded patches of minute recurved teeth in the upper pharyngeals; opposite to them, a few scattering minute teeth.

The dorsal fin commences half an inch posterior to a point vertical to the origin of the pectorals, subquadrate, and a little more than an inch high. Its first ray is a robust spine, slightly serrated on its posterior margin, and much shorter than the remaining rays. Adipose fin rounded, and opposite the termination of the anal fin. Pectorals placed low down, and in advance of the posterior angle of the opercle; its spine stout and pointed, with its anterior and posterior margins serrated, and its upper and under surfaces corrugated: the spine is shorter than the four following rays. Ventrals somewhat pointed, and originate at a point three-tenths of an inch behind the end of the first dorsal. Anal fin with seventeen rays, an inch and a half long, and six-tenths of an inch high. Caudal fin slightly but distinctly emarginate; the accessory rays indistinct. Vent with a double orifice.

Color. A uniform dusky brown above, approaching to black; beneath bluish white. Fins and cirri black; the former tinged with red.

Length, 9·0; of the head, 2·0.
Fin rays, D. 1.5.0; P. 1.7; V. 8; A. 17; C. 19.$\frac{3}{3}$.

This is very common in Lake Pleasant, Lake Janet, and many of the other lakes in the northern districts of the State. There are many varieties in its markings, and it occasionally exceeds a foot in length. Its principal use in those regions appears to be, to serve as bait for the lake trout.

THE BLACK CATFISH.

PIMELODUS ATRARIUS.

PLATE XXXVI. FIG. 116.—(CABINET OF THE LYCEUM.)

Characteristics. Black. Adipose dorsal long and slender; the rays of the fins passing beyond the membrane. Caudal emarginate, round, with numerous accessory rays. Length four to eight inches.

Description. Surface smooth and scaleless. Lateral line distinct, nearly straight, slightly convex under the dorsal fin. Head depressed, sloping. The barbels, in number and arrangement, resemble those of the preceding species. Lips fleshy, with minute punctures. Teeth in the jaws minute, long, conical and crowded. Tongue smooth. Humeral bone with a long concealed spine above the pectoral, and a short blunt rudimentary process directed downward at the upper angle of the branchial aperture.

The dorsal fin higher than long, arising midway between the pectorals and ventrals; the first ray an acute triangular spine; its anterior surfaces marked with oblique rugæ or wrinkles; its anterior edge smooth; a small accessory bone at its anterior base; six soft rays, the first and second longest. The adipose dorsal as far from the last rays of the first dorsal, as the anterior ray of that fin is from the end of the snout; long and slender, rounded, and laciniate at the tips. The pectoral fins nearly on the plane of the abdomen, and anterior to the upper angle of the branchial aperture, containing one spinous and seven branched rays: the spinous ray robust, triangular, slightly curved, with its anterior edge roughened, and its sides channelled as in the spine of the first dorsal; a small filamentous ray is connected with it, its posterior edges with decurved spines; the second, third and fourth rays somewhat longer than the spines. Ventrals small and feeble, pointed, their tips scarcely reaching the third anal ray; the third and fourth rays longest. Anal fin long; the first four successively longer, when they become subequal to the last four or five rays, when they gradually diminish in length. Caudal slightly emarginate, rounded at the tips.

Color. Deep black, occasionally blackish brown above and on the sides; ashen grey beneath.

Length, 4·5.
Fin rays, D. 1.6.0; P. 1.7; V. 8; A. 20; C. $17\frac{8}{8}$.

This species occurs commonly in Wappinger's creek, a tributary of the Hudson, Dutchess county. They occasionally occur there of dimensions larger than those given above.

In concluding the history of the Siluridæ observed in the State of New-York, I must call the attention of our ichthyologists to a species which has been rather indicated than described by Dr. Mitchill in the American Monthly Magazine for 1818. If there be no error in the description, it will form the type of a new genus in this family, already so rich in the variety of its forms. It approaches the *Silurus* of Cuvier and Valenciennes, of which they observe,

that they know of none in the rivers of the two Americas. On account of its dorsal spine, it cannot be admitted into that genus; and the same spine being smooth, and not serrated, excludes it from *Schilbe*. Its natural position in a general arrangement of the Siluridæ would seem to be between Schilbe and Cetopsis; forming a passage, by its simply spinous anterior dorsal and pectoral ray, from one to the other. It may be thus characterized: "No adipose fin; simple spines to the dorsal and pectoral; anal long; caudal pointed, not united to the anal." Important details respecting the teeth are wanting to complete the character. I subjoin the description:

"LONG-TAILED SILURUS. *Silurus gyrinus.* Without an adipose fin; without a second dorsal fin; and with a lengthened tail, resembling that of the common tadpole. Brought by Dr. B. A. Akerly from the Walkill, where the species is numerous, and an individual seldom equals the length of four inches. His general figure is that of a broad head horizontally extended; of a thin tail perpendicularly flattened, and of a belly giving him a roundish appearance towards the middle of the body. There are four cirri beneath the chin, two in the upper jaw, and two larger ones at the corners of the mouth. The gape is wide; mouth large; lips fortified with a row of small teeth; tongue broad, distinct. There is but a single dorsal fin, and that consists of seven rays, of which the first is spinous. About an inch behind it, commences the caudal fin, which is continued quite round the tail, and almost to the anal fin. The form is lanceolate and pointed; and the rays are so flexible and delicate, that in the specimen now before me, the caudal fin puts me in mind of a brush. It may be compared to the tail of an eel; the resemblance is nearer to that of a tadpole, when it approaches the period of conversion to a frog. The vent is nearly midway of the body. The anal fin, consisting of about sixteen rays, is situated between it and the caudal; for though the caudal is continued almost to it, there is no union. The pectoral fins have seven rays, of which the foremost is spinous. The spines of the several fins, though sharp, are not serrated. I could not discover any barbed or jagged configuration whatever in either of them. The abdominal fins are small, approximated, and almost as far back as the vent. The lateral line, after passing the thoracic parts, passes along to the middle of the tail, having the appearance of a dark stripe. The tail exhibits other faint marks of lines or stripes, while the trunk and head have a sort of mottled or clouded appearance. The belly is whitish or cream-colored.

"The want of serræ to the spines, and of a second dorsal fin, might lead some to remove this fish from the Silure family; but to avoid needless innovation, I retain him here."

(*EXTRA-LIMITAL.*)

P. cænosus. (RICHARDSON, F. B. A. Vol. 3, p. 132.) Barbels at the angle of the mouth, not reaching the gills. Br. rays 9. The pectoral spine strongly serrated. Caudal rounded. D. 1.7.0; P. 1.8; V. 8; A. 24; C. 17 $\frac{9}{12}$. Length ten inches. *Lake Huron.*

P. albidus. (LESUEUR, Mem. Mus. Vol. 5, p. 148.) Whitish ash. D. 1.6; P. 1.10; V. 8; A. 22; C. 10; Length 12 to 15 inches. *Delaware.*

P. borealis. (RICH. F. B. A. Vol. 3, p. 135.) Pectoral and dorsal spines not serrated. Dorsal subquadrangular. Caudal slightly forked, with rounded lobes. A. 25. Length two to three feet. *Northern Regions.*

P. lemniscatus. (LESUEUR, Mem. Mus. Vol. 5, p. 155.) Caudal united above to the long and low adipose fin, and nearly united to the anal beneath. Length 4 – 8 inches. *Southern States.*

P. furcatus. (ID. CUV. et VAL. Vol. 15, p. 136.) Elongate. Tail furcate. Adipose small and narrow. Anal fin with 32 to 34 rays. Length one to four feet. *Ohio, Louisiana.*

P. punctulatus. (ID. CUV. et VAL. Ib. p. 134.) Branchial rays twelve. Caudal even. Brown, punctured with black. Anal fin with seventeen rays. Length 2 – 3 feet. *Louisiana.*

P. æneus. (ID. Mem. Mus. Vol. 5, p. 150.) Lower jaw longest. Eleven anal rays; twenty-five to the even caudal. Allied to the preceding? Length 2 – 3 feet. *Ohio.*

Dr. Kirtland, in his Report on the Geology of Ohio, has given a catalogue of six others, some of which are probably included above.

P. cerulescens. The *Blue Catfish* of Ohio and the Lakes.

P. cupreus. The *Yellow Catfish.*

P. pallidus. The *Channel Catfish.*

P. nebulosus. The *Mud Catfish*, recognized by the scarified and clouded appearance of its skin.

P. xanthocephalus. The small *Black Bullhead* of the northern streams and lakes.

P. flavus. Young *Catfish*, with the rudiments of an adipose fin.

Genus AMBLYOPSIS.* Body with scales. Vent anterior to the base of the pectorals. Eyes concealed under the skin. Ventrals minute; a single dorsal. Teeth on the jaws and palatines. Head smooth, and without barbels.

A. spelæus. Whitish. Head broad and flattened. Mouth large. Most of the fins with filamentous tips. Length $3\frac{1}{4}$ inches. *Mammoth cave, Kentucky.*

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* NOTE. To add to the usefulness of this work as a book of reference, I introduce here a species which appears not to have been described, and for which I am in a manner compelled to construct a new genus. It is probably identical with the one noticed in the proceedings of the Academy of Natural Sciences, as follows: "A small white fish, eyeless, (presumed to belong to a subgenus of Silurus,) taken from a small stream called the River Styx, in the Mammoth cave, Kentucky, about two and a half miles from the entrance."

I have been much embarrassed to know where to place this species, and have delayed the publication of these pages, in hopes that some naturalist, with recent and perfect specimens before him, would ere this have favored the public with the result of his observations. The specimen from which I drew up the following notes was imperfect, and as it belonged to a public institution, could not with propriety be dissected. It has obviously the port and habit of the Siluridæ, and the obscure character of its eyes naturally recals the genus *Cetopsis* of Agassiz; but its scaly body, and head without barbels, forbid its arrangement even in that family as at present characterized. In the singular position of its vent, it resembles *Aphredoderus* among the Percidæ. I think it probable that it may form the type of a new family of the soft-rayed abdominal fishes.

A. spelæus. Body cylindrical in front, largest at its junction with the head, tapering and becoming gradually compressed behind. Surface covered with minute soft orbicular scales, becoming smaller on the back and towards the basal line of the head, and beneath the branchial membrane; they do not ascend upon the fins; the course of the lateral is only obvious on the posterior part of the body and tail. Head smooth, broad, flat, and gradually sloping from the elevated nape; its length to the total length as one to three and a half. Eyes large, vertical, not obvious, but their position

FAMILY CYPRINIDÆ.

Mouth slightly cleft; weak jaws, most frequently without teeth; margin of the jaw formed by the intermaxillaries; pharyngeals strongly toothed. Branchial rays few. Body scaly. One dorsal fin. Belly not compressed, never serrated. Intestinal canal short, without cæcal appendages. The least carnivorous of all fishes.

Obs. Two hundred and seventy species, arrayed under twenty genera, have been described from various quarters of the globe.

GENUS CYPRINUS. *Linneus, Cuvier.*

Body covered with large scales. A single elongated dorsal fin. Lips fleshy; mouth small, terminal. Teeth in the pharyngeals, but none in the jaws. Branchial rays three.

THE COMMON CARP. — (Introduced.)

CYPRINUS CARPIO.

Cyprinus carpio. Linn., Cuv. Règne Animal, Vol. 2, p. 271.

Characteristics. Color golden olive. The first ray of the dorsal and anal fin strongly serrated behind. Two barbules at the angle of the mouth. Dorsal fin long, emarginate. Length, six to twelve inches.

Description. Body covered with about twelve rows of large scales. A cirrus or barbel at the upper part of each corner of the jaw, with a second smaller one above it on each side.

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under the skin may be detected by removing the teguments. Nostrils near the margin of the jaw. Opercles smooth, and without spines or serratures. Branchial aperture large; the membrane with eight rays. No barbels nor cirri about the head, or depending from its jaws. Mouth wide; lower jaw longest, not as broad nor as much rounded as the upper jaw; it is armed with several rows of numerous minute, slender, long and pointed teeth directed backwards. In the upper jaw, similar but smaller teeth arranged in several rows, of which the outer are directed horizontally forward. Two rows of long hooked teeth on the palatines; vomer smooth. Tongue smooth and free.

The dorsal fin arises an inch and three quarters from the end of the snout, is higher than broad, composed of seven articulated feebly branched rays; its base 0·3, its height 0·5; it appears to lie in a furrow, but this may have arisen from the shrinking of the animal in spirits. Pectorals 0·6 long, with a narrow base of 0·15, with twelve articulated and branched rays; the middle rays are long and filamentous, extending nearly to the origin of the dorsal fin. Ventrals very feeble, of five rays; the filamentous tips reaching nearly to the origin of the anal. Anal fin quadrangular, arising under the fifth dorsal ray, and containing eight articulated rays. Caudal pointed; its middle rays longest, 0·6 long, but appeared to have been mutilated. Vent a small circular orifice in advance of the base of the pectorals, and only 0·8 from the tip of the lower jaw.

In alcohol, it appeared to have been of a uniform dull yellowish white. Length, 3·5; of the head to the edge of the opercles, 1·0. Breadth of the head at the basal line, 0.6. D. 7; P. 12; V. 5; A. 8; C. 16 $\frac{5}{6}$. (*Cabinet of the Lyceum of Natural History.*)

Eyes small. Nostrils large. Opercle with striæ radiating from the anterior edge. Nape and back rising suddenly.

Dorsal fin long, with its first ray bony, the second bony and serrated on its posterior surface, the third flexible and longest. Dorsal and anal coterminal. Ventrals arise under the third ray of the dorsal; the first ray of the anal fin robust, bony, serrated behind. Tail forked. Lateral line interrupted, straight. Vertebræ 36.

Color. Golden olive brown; head darkest. Irides golden. Belly yellowish white.

Length, 6·0 – 12·0.
Fin rays, D. 22; P. 17; V. 9; A. 8; C. 19.

The Carp is a native of the lakes and rivers of the southern parts of Europe. In Austria and Prussia, their growth is carefully cultivated, and the traffic in them so considerable, that in places which are favorable to their increase, the yearly rent of an acre of water is equal in value to that of an acre of land. They are not found as far north as Russia, and were introduced into England about three hundred years ago. I am not aware that any attempt has been made to introduce the Carp into this country previous to the year 1831, which, it will be seen by the following letter from Henry Robinson, Esq. of Newburgh, Orange county, was attended with complete success.

"I brought the Carp from France in the years 1831 and 32, some two or three dozen at a time, and "generally lost one-third on the passage. I probably put into my ponds six or seven dozen. They soon "increased to a surprising degree, and I have now more than sufficient for family use. I have not "paid much attention to their habits, but I have noticed that they spawn twice a year; first about the "middle of May, and again in July. It is said in France that they spawn three times, but I have not "observed it. During the period of spawning, which lasts about ten days, it is very amusing to watch "their operations. They come up to the surface, and the females deposit their spawn along the sides of "the pond among the grass, where they are impregnated by the males as they are emitted. During this "process, they keep the sides of the pond in a foam with their gambols, and it is not difficult at that time "to take them with your hands. They grow quickly, reaching three or four inches the first year, but "after that time their growth is very slow. The largest I have taken yet have not exceeded ten or eleven "inches, my ponds being too small for them to equal the size of those you see in Europe. They are "very shy of the hook; I generally bait with small pieces of fresh bread, (of which they are very fond,) "made up into small pills with the fingers, and at the same time drop a small piece of bread into the "water near the hook, when they bite readily. My ponds are supplied by springs of pure and clear "water, but they keep the water in such a state that they cannot be seen at the bottom.

"For the last four years past, I have put from one to two dozen carp every spring in the Hudson river "near my residence. They have increased so much that our fishermen frequently take them in their "nets. They are larger than those in my ponds."

This interesting note is important, as establishing the practicability of introducing foreign fishes into our waters, and as recording an important fact in Ichthyology. We invite other patriotic individuals to make similar experiments with other species, which are now limited to the other side of the Atlantic. From recent experiments made in Europe with impregnated

ova of fishes, we see no reason to doubt why the turbot and sole, and other equally savory fishes of Europe, may not be successfully introduced upon our seacoast.

THE GOLD CARP. — (Introduced.)

CYPRINUS AURATUS.

Cyprinus auratus. LINNEUS.
Gold-fish. SMITH, Fishes of Massachusetts.
The Golden Carp. STORER, Zoology of Massachusetts, p. 82.

Description. The varieties in color, shape, position of the fins, and even their number, has been so much influenced by domestication, that the application of any distinctive phrase is almost impossible.

De Sauvigny, in his *Histoire Naturelle des Dorades de la Chine*, has figured eighty-nine varieties of this species, and this list might be almost indefinitely extended. The following are the most usual appearances: Brilliant red or orange above; silvery beneath. Occasionally black, or black and white, or wholly of a brilliant silvery color. The opercles with radiating striæ. Scales large, striated, and rough to the touch. The number of fin rays very variable, but the following is often observed:

Fin rays, D. 16; P. 15; V. 9; A. 18; C. 17.

The Golden Carp, or Gold-fish, as it is more generally called, was introduced from China into Europe in the early part of the seventeenth century, and probably shortly after found its way to this country. They breed freely in ponds in this and the adjoining States. They are of no use as an article of food, but are kept in glass vases as an ornament to the parlor and drawing-room. They are said to display an attachment to their owners, and a limited obedience to their commands.

GENUS ABRAMIS. *Cuvier.*

No bony rays nor barbels. Body deep, compressed. Dorsal and abdominal line very convex. The dorsal fin short, placed behind the line of the ventrals. Anal long.

THE VARIEGATED BREAM.

ABRAMIS VERSICOLOR.

PLATE XXXII. FIG. 103.

Characteristics. Silvery varied with green, blue and golden. Anal with fourteen rays. Length five to seven inches.

Description. Body compressed, with its dorsal and abdominal outlines very convex. Scales very large, orbicular, with excentric striæ. Lateral line commences at the upper angle of the branchial aperture, descends gently a short distance, when it suddenly curves downwards with a broad curve below the middle of the body, following the abdominal outline to the tail; the scales of this line contain short and somewhat irregular tubes. Head small, smooth, slightly depressed above, with a range of pores on its upper part. Three flat branchial rays. Mouth protractile, opening somewhat vertically. Upper pharyngeal paved; lower pharyngeals with three or four stout white teeth.

The dorsal fin higher than long, subquadrate, placed behind the line of the ventrals; the first ray short, simple, not spinous, and closely adpressed to the second, which is longest, and similar in structure to the first; the remaining rays very ramose, successively shorter. The pectorals broad, placed very low down; upper ray simple and longest; the remainder slender, and difficult to be enumerated. Ventrals approximated. Anal longer than high, placed posterior to the termination of the dorsal, excavated on its margin, and composed of one simple and thirteen branched rays. Caudal forked; the base covered to some distance up with scales. Air-bladder bipartite.

Color. This is so varied as to render it difficult to convey an idea by description alone. General hue silvery, mixed with green and blue above, becoming golden on the sides and abdomen. Irides yellow. Opercles and suborbitals brilliant, lustrous, white, with metallic reflections. Upper part of the head deep brownish black; back dark green, passing into blue. Pectorals and anal dull yellow. Ventrals deep orange. Dorsal and caudal fin brownish black; the former with a faint yellowish tinge on its membrane.

Length, 5·0 – 7·0.
Fin rays, D. 9; P. 14; V. 9; A. 14; C. 19 $\frac{4}{4}$.

This is a savory fluviatile species. It appears occasionally in the New-York market, from the Connecticut and Hudson river and the streams of Long Island. It is abundant near Peekskill, where it is called Dace, from its resemblance to the Dace of Europe, which,

however, belongs to another genus. It is also called the *Yellow-bellied Perch*, and *Wind-fish*; which induced one of our most zealous and acute ichthyologists, Mr. I. Cozzens, to designate it many years since in a MSS. description as *Cyprinus eolus*. The name of *Wind-fish* is derived from one of its habits. Whenever a light flaw of wind ruffles the water, thousands of these fish may be seen darting to the surface, and as suddenly disappearing.

(*EXTRA-LIMITAL.*)

A. smithii. (Richardson, North. Zool. Vol. 3, p. 110, figure.) Tongue toothed. Dorsal with 1.12, and anal with 1.27 rays. Length 9–10 inches. *St. Lawrence river.* An *Abramis?*

A. balteatus. (Id. Ib. p. 302.) A broad scarlet stripe from the gills to the anal, beneath the lateral line. D. 11; A. 19 to 22. Length 5 or 6 inches. *Columbia river.*

GENUS LABEO. *Cuvier.*

Dorsal long. No spines nor barbels. Lips fleshy, and frequently crenated.

THE NEW-YORK CHUBSUCKER.

Labeo elegans.

PLATE XXXI. FIG. 100.

Characteristics. Bluish above; head greenish. Dorsal subquadrate, rounded above, with twelve rays. Length eight inches.

Description. Body compressed. Dorsal and abdominal outlines convex. Scales large, with from three to six radiating impressed lines, crossed by others waved and concentric; they extend high up on the caudal rays. Head smooth, scaleless; its outline suddenly depressed below the line of the back, and with several irregular protuberances between the nostrils and the tip of the snout. Lateral line obscure. Jaws toothless, the lower received within the upper. Branchial rays three, compressed.

The dorsal fin nearly quadrate, higher than long, with its anterior rays longest; its margin rounded. It arises somewhat anterior to the centre of the body, and over the ventral fin. Pectorals placed low down, long and pointed in a state of repose; but when displayed, rounded. The ventral fins originate nearly under the centre of the dorsal fin. The anal fin large, and, when closed, extending beyond the tail, and some distance along the caudal fin. This latter fin broadly emarginate, with its lower lobe frequently largest.

Color. Above dark bluish; beneath whitish, with pinkish suffusions along the abdomen. Head brilliant green, passing into yellowish and golden on the opercles. Dorsal and anal fin brown. Pectorals and ventrals faint orange. Caudal rosaceous.

Length, 8·0.
Fin rays, D. 12; P. 15; V. 9; A. 8; C. 17.

This fish occurs in the markets of New-York in October and November. It is held in little estimation for food. It can scarcely be confounded with the *Cyprinus oblongus* of Mitchill, to be presently described.

THE BRILLIANT CHUBSUCKER.

LABEO OBLONGUS.

PLATE XLII. FIG. 136.

The New-York Chub, Cyprinus oblongus. MITCHILL, Report in part, etc. p. 23.
Chub of New-York, C. id. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 459.

Characteristics. Dorsal with thirteen rays. Back arched. Anal bilobate. Beautifully varied with green and yellow, and with obscure transverse green bands. Length six to twelve inches.

Description. Body compressed; dorsal outline arched; the facial outline nearly continuous with the curve of the back, anterior to the dorsal fin. Head somewhat depressed. Scales large, with radiating and waved concentric striæ; they are rather crowded near the shoulder, and ascend on the caudal fin. Lateral line indistinct. Snout blunt, and, in the dried state, exhibits a tubercle above. Mouth inferior, corrugated, toothless, bilobate beneath. The dorsal fin commences at a point equidistant from the end of the snout, and a line vertical to the end of the anal. It is high, nearly equalling one-third of the greatest depth of the body; the first ray shortest, and adhering closely to the second, which is also simple; the remainder branched. The pectorals low down and rounded. Anal fin broad, bilobate, with very ramose rays; its anterior ray simple. Caudal broadly emarginate, with 2 – 3 accessory rays; the lower lobe largest. Air-bladder single, cylindrical.

Color, of the upper part of the head, dark slate. Back greenish, fading into brilliant lemon-yellow on the sides. Four to six vertical obsolete bands, resplendent bluish green on the back, and becoming effaced on the sides. Opercles yellow, with tints of green and pink. Dorsal, caudal and anterior portion of the anal brown. Pectorals brownish; red at the base. Ventrals yellow. Second lobe of the anal dull red.

Length, 6·0 – 12·0.
Fin rays, D. 13; P. 13; V. 9; A. 8; C. 19 $\frac{2}{2}$.

The specific name given to this species by Dr. Mitchill, appears singularly inappropriate. It is a fish of much beauty, but its brilliant hues soon disappear when taken from the water. The accompanying figure was made from a remarkably vigorous and active individual, but it scarcely does justice to its actual brilliancy. It is familiarly known under the name of *Chub*, and *Chubsucker*. As much confusion arises from applying the same popular names to Ame-

rican and English species, I make use of the name *chubsucker* as more distinctive. It is common in many of our fresh-water streams, and usually appears in the markets in the month of December. It appears closely allied with the *gibbosus* of Lesueur, and also with the succeeding species.

THE LONG-FINNED CHUBSUCKER.

LABEO CYPRINUS.

PLATE.

Catostomus cyprinus. LESUEUR, Journ. Acad. Nat. Sciences, Vol. 1, p. 91.

Characteristics. Body high, compressed. Dorsal long, elongated in front, low and subequal behind.

Description. Body elliptical, compressed. Scales semi-rhomboidal, very large, radiated; a range of smaller ones along the base of the dorsal fin. Lateral line descending with a slight curve from the upper part of the branchial aperture, to beneath the anterior portion of the dorsal; thence straight. Mouth crenated, bilobate beneath. Dorsal outline in front of the fin, convex; facial outline sloping, nearly straight. Snout projecting over the jaw. The dorsal fin commences about midway between the pectorals and ventrals; its third? ray very long; thence rapidly diminishing to the eleventh; the remainder subequal. Pectorals and ventrals small. Anal excavated on its margin. Caudal deeply forked, with pointed lobes.

Color. Scales variegated with blue, yellow and green. All the fins grey blue.

Length, 12·0 – 20·0.
Fin rays, D. 31; P. 18; V. 9; A. 10; C. 18 $\frac{4}{4}$.

This fish, which is commonly called *Carp*, in consequence of its resemblance to the carp of Europe, is common in the Susquehannah, and will probably be found in some of its sources within this State. I am indebted to M. Lesueur for the figure and very brief description.

THE GIBBOUS CHUBSUCKER.

LABEO GIBBOSUS.

PLATE XXXII. FIG. 101.

Catostomus gibbosus. LESUEUR, Journ. Acad. Nat. Sc. Phil. Vol. 1, p. 92.
C. id., The Gibbous Sucker. STORER, Fishes of Massachusetts, p. 88.

Characteristics. Dorsal with seventeen rays. Tail deeply emarginate. Body gibbous. Length seven to twelve inches.

Description. Head nearly as high as long. Scales crowded transversely a short distance from the opercles, but more developed on the posterior part of the body. Lateral line scarcely perceptible. Snout short, rounded. Mouth terminal, with thick fleshy lips, toothless. The

dorsal fin quadrate, rounded above. Pectorals placed low down, and rounded. Ventrals placed under the posterior part of the dorsal. Anal fin deeply emarginate, not reaching the base of the caudal fin. This latter fin semilunate when extended; the lobes rounded, unequal.

Color. Deep blue on the back, with golden reflections. Four or five faint transverse bands across the back. Pectorals, ventrals and anal fins reddish orange. Caudal tinged with carmine and violet. Dorsal bluish green. Abdominal scales red at their bases.

Length, 11·0.
Fin rays, D. 17; P. 16; V. 9; A. 9; C. 18.

I have seen this species in the Mohawk, and have reason to believe it to be common in many other fresh-water streams in this State.

THE ROUND-BACKED CHUBSUCKER.

LABEO ESOPUS.

(CABINET OF THE LYCEUM.)

Characteristics. Back elevated. Dorsal fin with twelve rays. Scales oblong. Lateral line indistinct. Length ten and a half inches.

Description. Body robust, compressed, gibbous anterior to the dorsal fin. Scales large, subquadrate, longer than high; the triangular area on the free portion with four radiating lines; the interstices between these lines with concentric wrinkles. Lateral line not obvious; a few scattering tubes irregularly disposed, being the only indications of it. Facial outline sloping. Head flattened above; no regular series of mucous pores observed on the head or the gill-covers. Eyes moderate; the upper margin of the orbits somewhat raised above the plane of the head. Nostrils double, approximated, vertical; the posterior very large; the anterior with a small valvular membrane. Snout somewhat prominent, abruptly descending. Gill-covers large; the posterior margins smooth and rounded, almost vertical.

The dorsal fin arises midway between the snout and the base of the caudal fin; it contains eleven articulated rays, and a short rudimentary ray in front; it is oblong, subquadrate, longer than high. Pectorals with sixteen rays, obtusely pointed; its longest ray equalling in length the longest rays of the ventral or anal fin. Ventrals broad and rounded, under the middle of the dorsal, with nine rays. Anal emarginate, with two simple subspinous rays in front, and seven articulated rays. In the anterior portion, the third branched ray is longest; the last three rays shorter than the others; the tips do not reach to the base of the caudal fin. Caudal emarginate, scaly at the base.

Of the color I can say nothing, as the specimen was in spirits, but it appeared to have had neither spots nor bands.

Length, 10·5; of the head, 2·4. Greatest depth, 3·0.
Fin rays, D. 12; P. 16; V. 9; A. 7; C. 19 $\frac{3}{3}$.

The specimen purports that it came from the interior of the State. It approaches in its general form the *gibbosus* of Lesueur, but is sufficiently distinguished by the number of the dorsal rays.

GENUS CATOSTOMUS. *Lesueur, Cuvier.*

Both lips thick, fleshy, and crenated or plaited; the lower lip pendant. Dorsal placed above the ventrals, and usually short.

Obs. This genus, as far as hitherto known, contains exclusively North American species.

THE COMMON SUCKER.

CATOSTOMUS COMMUNIS.

PLATE XXXIII. FIG. 106.

Catostomus communis. LESUEUR, Journ. Acad. Nat. Sc. Vol. 1, p. 96, plate.

Characteristics. Body long, rounded and tapering. Caudal fin lunate, almost furcate. Length 12 – 14 inches.

Description. Body cylindrical, sub-compressed, broad and rounded above to the origin of the dorsal fin, and compressed towards the tail. Head smooth, scaleless. Scales reticulate, small on the back and anterior part of the body, larger near the dorsal fin, and increasing in size to the tail. Lateral line not concurrent with the back, slightly concave, nearly straight. Three to five smooth tubercular elevations towards the extremity of the snout, scarcely obvious in the fresh, but manifest in the dried specimen. A row of mucous ducts (sutures of Forster) extend from near the upper angle of the opercle, across the nape, to the same spot on the opposite side, and separating the smooth head, on what is sometimes called *the basal line of the head*, from the scaly body. From this transverse line proceed two others forward, about half an inch apart, in a sinuous course over the eyes and nostrils, and are lost in the vicinity of the tubercles before mentioned. From near the extremity of the snout, proceed two other series of mucous ducts (one on each side) upwards beneath the orbits, thence behind the orbits, rising up in an irregular curve, and turning down at the upper angle of the branchial aperture, where it is lost in the lateral line. These various lines are not exhibited on the plate, but are manifest in the recent specimens. Eyes moderate. Nostrils oval, apparently single, contiguous; the posterior closed by a valve. Mouth protractile, with thick puckered lips; the lower lip bilobate, as represented in the plate.

The dorsal fin subquadrate, highest in front, with its margin slightly concave, arising nearly equidistant from the snout to the base of the caudal fin. Pectorals inserted nearly on a horizontal plane, and very low down, long, pointed; as long as the head. Ventrals broad, truncated, shorter than the pectorals, and placed under the middle of the dorsal. Anal fin long, pointed, higher than broad, its extremity reaching to the base of the caudal fin; the first ray

short and simple; the next, simple, articulated, and twice its length; the succeeding ones branched; the fourth and fifth subequal, longest; thence gradually diminishing behind; the last a mere rudimentary ray. Caudal with stout branched articulated rays, lunate, almost furcate. Air-bladder divided into two unequal parts, connected by a short tube; the anterior subcordate; the posterior longer, cylindrical, gradually diminishing behind.

Color. Head dark green above, verging to black. Cheeks bronze and golden. Body above dark purplish, with pink and metallic tints on the sides, frequently of a resplendent golden hue extending over the abdomen; beneath white. Pectoral, ventral and anal orange-colored; dorsal light brown; caudal deep brownish or blackish. Irides varied with brown and white.

Length, 14·0.
Fin rays, D. 13; P. 16; V. 10; A. 8; C. 17–18 $\frac{4}{4}$.

So little attention has been paid to the careful discrimination of species in this genus, that I fear to add to the already existing confusion by citing synonimes. After a careful comparison of the descriptions of Forster and Peck, I find such slight and scarcely appreciable differences as to render it probable that they all refer to the same species. It is very evident from Forster's description of the tubercles and the sutures, and his silence respecting the color of the eyes, that he had a dried specimen before him.* The notice by Schœpff of another species, which is loose and indefinite, I insert below.† Although the figure of Peck is scarcely recognizable, owing to the low state of the arts at that period, yet his description agrees in the main with that of Forster. The description of the *C. teres* by Dr. Mitchill may apply to several species, but I know of no *Catostomus* common here, "with an almost even tail." I can see but very slight and unimportant differences in the characters assigned by Lesueur to his *C. bostoniensis, hudsonius* and *communis*. A better defined character of the genus, and a careful description and comparison of the species, is still a desideratum.

The Common Sucker is abundant in our markets in the autumn, when its flesh is considered to be improved in quality. At the best it is, however, meagre and tasteless.

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* "*Cyprinus catostomus*, var. Prinna anali radiis 7. Labeo imo caruncula triloba papillosa. Cauda semilunata." (FORSTER.)

† *Sucker in Pennsylvania.* "Head somewhat thicker than the body, front very flat; towards the projecting snout, the head becomes smaller. Mouth beneath without teeth, and presents a subtriangular opening covered by a soft warty sucking lip. Br. membrane three-rayed. Body roundish above, sub-compressed, elongate, scaly and silvery. The lateral line bends itself at first somewhat downward, and then goes off straight. Tail somewhat furcate. D. 13; P. 17; V. 9; A. 7; C. 18–20.

"Those which I saw in Philadelphia, were caught in the Delaware. They do not come to New York, although they are common in the small streams of the Hudson. The individual described by Forster came from Hudson's bay, and is undoubtedly the same species, although the number of rays somewhat varies." (PECK.)

THE ONEIDA SUCKER.

CATOSTOMUS ONEIDA.

(CABINET OF THE LYCEUM.)

Characteristics. Back gibbous, with two short subspinous rays to the dorsal fin. Head smooth, with numerous mucous pores. Length 12 inches.

Description. Body much arched on the dorsal outline, declivous in front, with a small head. Scales very large, rounded, truncate and emarginate on the radical extremity; the rounded portion with radiating plaits; the free portion with 6 – 8 minute diverging elevated lines; the margin with an elevated border. Seventeen scales in an oblique series from the dorsal fin. Lateral line commences in the same plane with the central portion of the eye, concurrent with the back, and rather above the middle of the height of the body, through a series of forty-five scales. Head smooth, with a series of mucous pores across the nape, descending below the upper angle of the opercle. From above this angle, another series on each side advances towards the orbits, and dividing into two others, one of which passes over the orbits, and disappears near the nostrils; the other passes behind the eye, where it throws off a branch, which proceeds directly under the orbits in a waved direction to near the tip of the snout; the other branch follows the margin of the preopercle. Eyes moderate, 0·4 in diameter. Nostrils contiguous; the posterior largest. Mouth beneath, with plaited lips.

The dorsal fin above the ventrals; its first articulated ray equal to the length of its base; the two first articulated rays longest; the last slightly longer than its antecedent. Two very short subspinous rays before the first. Pectoral low down, two inches long, and with fifteen rays. Ventrals robust, broad, with multifid rays. Anal placed in a sheath, with seven complete and one accessory ray; this fin is remarkably stout and pointed; its longest ray the third, which is equal to the length of the head. Caudal furcate, with rounded lobes, each of which is equal in length to the anal.

Color. Dark bluish brown above; lighter on the sides; whitish beneath.

Length, 12·0. Head, 2·5. Greatest depth, 2·0.
Fin rays, D. 2.13; P. 15; V. 9; A. 8; C. 18 $\frac{3}{3}$.

Common in Lake Oneida, where it is called *Mullet*, and *Sucker*.

THE HORNED SUCKER.

CATOSTOMUS TUBERCULATUS.

PLATE XXXI. FIG. 97.

Catostomus tuberculatus. LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 93.
C. tuberculatus, The Horned Sucker. STORER, Massachusetts Report, p. 85.

Characteristics. Body short and thick. Caudal lunate. Three to five tubercles on each side of the snout. Length seven to nine inches.

Description. Body robust, cylindrical. Dorsal outline gibbous, terminating abruptly on the nape. Upper part of the head declivous, nearly straight. Scales large, radiated, with deep concentric undulations interrupted by the striæ. Lateral line very indistinct. Head smooth. Between the eyes and the snout, on each side, from three to five tubercles. In the specimen before me, there are but three, subequal: one immediately anterior to the eye; another 0·2 distant, nearly on the same plane, and towards the margin of the upper lip; the third near the angle of the mouth. These tubercles are smooth, 0·2 high, terminating in a blunt point, somewhat recurved, with a broad dilated base. Eyes small. Nostrils double, with a small filamentous strip. Snout blunt. Mouth small, lunate. Lower lip carunculate. Air-bladder single.

The dorsal fin subquadrangular, rather longer than high, arising rather nearer the snout than the base of the caudal fin; the first ray simple, subspinous. Pectorals placed very low, and rounded. Ventrals under the middle of the dorsal. Anal robust, emarginate; the third, fourth and fifth much longer than the others. Caudal lunate; the lobes unequal.

Color. Head dark olive-green. Back and sides of the body green, with purple and golden reflections. Sides tinged with yellow. Abdomen yellowish, with a faint flesh-color. Anal fin dark blackish-brown; the caudal rather lighter; the remaining fins light olivaceous. Base of the pectorals flesh-colored.

Length, 9·0. Depth, 2·9.
Fin rays, D. 15; P. 16; V. 8; A. 10; C. 19 $\frac{2}{2}$.

The Horned Sucker is common in most of the fresh-water streams of this State, and is also found in New-Hampshire, Massachusetts, Connecticut, New-Jersey and Pennsylvania. I am not acquainted with its westerly or southerly distribution. It is known under the various popular names of *Barbel*, *Dace*, and *Horned Dace*. It is considered by many as well tasted. It is readily taken with the hook, and begins to bite in this State about the middle of April. It was first described by Lesueur, from a specimen five inches long, which is rather less than the average size. Dr. Storer has described a specimen fourteen inches long, which is unusually large. The uses of the tubercles are not very apparent. Lesueur is inclined to the opinion that they may be a sexual distinction, but this has not been confirmed by my observations.

THE PALE SUCKER.

CATOSTOMUS PALLIDUS.

PLATE XXXIII. FIG. 104.

Characteristics. Sides pale. The two portions of the air-bladder united by a wide aperture. Caudal fin furcate. Length 9 – 10 inches.

Description. Body rounded, subquadrate, being quite depressed on the back anterior to the dorsal fin, and the sides are nearly vertical. Scales with concentric and radiating impressions, round, and festooned on the exposed margins; small on the back and shoulders, becoming gradually larger to the tail. Lateral line nearly medial, very slightly curved. Eyes large, somewhat nearer the edge of the branchial aperture than to the end of the snout. A series of mucous pores running over each eye, and terminating above the nostril; another from near the extremity of the snout, proceeds under the eye, then rising closely behind it, runs backward near the upper angle of the gill opening, thence to the nape, which it crosses to meet a similar series on the other side. Upper surface of the head and snout smooth, with the slight inequalities common to the genus, and which are scarcely obvious in the living specimens.

The dorsal fin scarcely longer than high, slightly excavated above; its first ray short and simple; the first articulated ray longest: this fin commences equidistant between the snout and the base of the caudal fin. Pectorals pointed, equal in length to the anal. Ventrals short, and placed under the posterior part of the dorsal. Anal fin long, subacute, reaching to the base of the caudal fin. Caudal furcate. Air-bladder divided into two separate portions; the posterior longest, elliptical, with its posterior extremity attenuated behind; anterior long and subcordate, less in diameter than the posterior portion.

Color, of the head dark greenish, with metallic reflections on the cheeks. Irides golden. Back light bluish, becoming mixed with yellow and paler on the sides. Abdomen white. Dorsal and caudal dark brown mixed with yellow. Anal with a faint tinge of yellow. Pectorals and ventrals orange.

Length, 9·0. Depth, 1·8.
Fin rays, D. 13; P. 16; V. 9; A. 8; C. 18 $\frac{4}{4}$.

The Pale Sucker is a common species, and is taken about the beginning of April. It is abundant near Peekskill. I was at first disposed to arrange it with the preceding, with which it agrees in many particulars. Its uniformly pale appearance, forked tail, and the form of its air-bladder, have induced me to treat it as distinct, although closely allied to that species.

THE MULLET SUCKER.

CATOSTOMUS AUREOLUS.

PLATE XLII. FIG. 133.—(STATE COLLECTION.)

Catostomus aureolus. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 1, p. 95.
C. id., Gilt Sucking Carp. RICHARDSON, Faun. Boreal. Am. Vol. 3, p. 119.

Characteristics. With four or five dusky longitudinal stripes. Anal extending beyond the base of the caudal fin, which is furcate. Length twelve to eighteen inches.

Description. Body subcylindrical, compressed towards the tail. Scales very large, adherent, subquadrate, longer than high, subequal; the surface covered with minute concentric striæ; the attached portion with 10 – 12 irregular radiating raised lines; the posterior portion with about four distinct radiating raised lines, and numerous radiating striæ; the free margin irregularly rounded; the anterior margin prolonged in its medial portion. Twenty-four scales were counted in the course of the lateral line, and twelve in an oblique course from the origin of the dorsal to the base of the ventral fins. The lateral line arises from about the upper third of the opercular margin, and is nearly straight. Head smooth, flattened above. Snout ending in a blunt point. Eyes rather oblong, 0·5 in their greatest diameter, and about three diameters apart. Nostrils double, contiguous, 0·3 in advance of the eyes, with a semilunar valve on the anterior margin of the posterior pair. Mouth plaited, protractile.

The dorsal fin arises nearly equidistant between the tip of the snout, and a point vertical to the posterior ray of the anal fin: it is composed of fifteen rays; the first short, the second longest, both simple, the remainder branched; the edge of this fin slightly emarginate. Pectorals large, pointed, with eighteen rays; the first simple, rigid for nearly half its length. The ventrals broad, truncated, with nine rays. The vent covered by a sort of membranous pouch. Anal long and pointed, with robust rays; the first, slender, short; the fifth very long, its tip reaching beyond the base of the caudal fin, which is forked, and often with unequal lobes.

Color. Greenish above, with metallic greenish reflections when viewed in certain lights. Sides lighter, with the same metallic reflections; beneath white. About five dusky obsolete longitudinal lines on each side above; the superior pair arising from the origin of the dorsal fin, diverging and then uniting behind the neck. Gill-covers with metallic brassy reflections. Upper part of the head and snout bluish brown. Pectorals, ventrals and anal tinged with reddish. Dorsal and caudal bluish brown. Irides golden, varied with white.

Length, 18·0. Depth, 3·5.
Fin rays, D. 15; P. 18; V. 9; A. 8; C. 18 $\frac{2}{2}$.

The specimen described above, was one of the largest dimensions. It is very indifferent food. It is very common in Lake Erie, and at Buffalo passes under the various names of *Mullet*, *Golden Mullet*, and *Red Horse*. In August and September, I observed them to

be full of worms. The dusky longitudinal lines, which are distinctly visible in the newly captured fish, disappear almost immediately after death. It is a very beautiful and distinct species.

THE BLACK SUCKER.

CATOSTOMUS NIGRICANS.

Catostomus nigricans. LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 102.
C. nigricans, The Black Sucker. STORER, Massachusetts Report, p. 86.

Characteristics. General hue approaching to black. Head large, quadrangular. Anal fin straight; its extremity reaching the base of the caudal fin. Length 13 inches.

Description. Body subquadrangular near the head. Tail straight, short. Eyes oblong. Scales moderate, roundish. The lateral line runs in a straight course from the branchial aperture, below the range of the eye, to the tail. Dorsal fin quadrangular and small. Anal fin with its third and fourth rays longest, reaching on to the caudal fin. Caudal fin forked, with pointed lobes.

Color, of the back, blackish; sides and abdomen reddish yellow, with dusky blotches; beneath white. Pectoral, abdominal and anal fins reddish; caudal and dorsal fins dashed with black.

Length, 13·0 – 20·0.
Fin rays, D. 13; P. 18; V. 9; A. 8; C. 18.

This species is common in Lake Erie, where it is frequently called by the whimsical name of *Shoemaker*, probably in allusion to its being something of the color of shoemaker's pitch. Dr. Storer has observed it at Walpole (Mass.)

THE LARGE-SCALED SUCKER.

CATOSTOMUS MACROLEPIDOTUS.

PLATE.

C. macrolepidotus. LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 94.

Characteristics. Bluish above; sides whitish. Dorsal fin short; the anterior lobe elevated and pointed; the posterior lobe rounded. Scales large.

Description. Body compressed and fusiform, elevated on its anterior part, rounded near the nape. Head somewhat declivous, longer than deep. Scales large, and disposed in a lozenge form. The lateral line rises at the nape of the neck, descends along the gill-cover, and thence to the tail in a line with the centre of the eye. Dorsal fin short. Pectorals and ventrals small.

Anal fin straight, long, and passing the base of the caudal fin. Caudal forked, with pointed lobes.

Color. Back dark blue; base of the scales brown; sides whitish, with yellow reflections. Opercles yellowish. Head reddish brown. Dorsal, anal and ventral tinged with blue and yellow; caudal greyish.

Fin rays, D. 16; P. 18; V. 9; A. 9; C. 18 $\frac{5}{5}$.

Mr. Lesueur has not given the dimensions of this very distinct species, which is found in the River Delaware, and doubtless exists in this State. I have given a copy from Lesueur's figure. He notices, in another place, that the figure of the dorsal fin is not always as much excavated. In the males, according to Lesueur, the fin is obliquely truncated, and not hollowed out. It appears to be a common species.

(*EXTRA-LIMITAL.*)

C. longirostris. (Lesueur, Ac. Sc. Vol. 1, p. 102.) Head flat, with a long snout. Scales small and rounded. Anal fin not touching the base of the caudal. D. 12; A. 7. Length five inches. *Vermont.*

C. maculosus. (Id. Ib. p. 103.) Head large, quadrangular. Eyes small. Color reddish, with irregular blotches of black. Lateral line straight, running in a line with the eye. Pharyngeal teeth hooked. A. 9. Length 8 inches. *Maryland.* An Var. *nigricans?*

C. elongatus. The Missouri Sucker, Black Horse and *Black Buffalo.* (Id. Ib. p. 103.) Body very long. Dorsal as long as one-third of the body, with 32 rays. Length two feet. *Ohio.*

C vittatus. (Id.) A black stripe passes from the snout, through the eyes, to the caudal fins. Scales very small, rounded. Length 2 inches. *Philadelphia.*

C. duquesnii, The White Sucker. (Id.) Scales large, trilobate. Head one-fifth of the total length. Caudal deeply forked. Mouth wide. D. 14. Length 19 inches. *Pittsburgh.*

C. sucelta. (Lacepede.) Head compressed, flat. Lower lip very thick, crenated. Scales semi-rhomboidal. Sides silvery. D. 12; A. 9. Length one to two feet. *South-Carolina.*

C. maxilingua. The Little Sucker. (Lesueur, Ac. Sc. Vol. 1, p. 85.) Sides blue, with a brownish band. A black spot on the base of the caudal fin. Dorsal high. Caudal forked. D. 9; A. 9. Length four inches. *Delaware.* An juv.?

C. sueuri. (Richardson, F. B. A.) Brilliant metallic colors. Scales very large. Air-bladder divided into three portions. D. 14; A. 9. Length 19 inches. *Northern Regions.*

C. forsterianus. Red Sucker. (Id. Ib.) Scales broadly oblong, radiated. Dorsal higher than long, with 12 to 14 rays. Anal 8 or 9, not reaching to the base of the caudal. Length 22 inches. *Northern Regions.*

GENUS STILBE.

Body compressed. Dorsal and abdominal outlines convex. Head small, with no teeth nor barbels. A short spine before the dorsal fin, which is short. Anal fin long. With the other characters of Cyprinus.

THE NEW-YORK SHINER.

STILBE CHRYSOLEUCAS.

PLATE XXIX. FIG. 91.

Cyprinus crysoleucas, Shiner. MITCHILL, Report in part, &c. p. 23.
The New-York Shiner, C. crysoleucas. ID. Tr. Lit. and Phil. Soc. N. Y. Vol. 1, p. 459.
Leuciscus chrysoleucas, New-York Shiner. STORER, Fishes of Massachusetts, p. 88.

Characteristics. Greenish above; sides silvery. Dorsal and abdominal outlines convex. Head very small. Length three to six inches.

Description. Body much compressed, deep; one-third of the total length, measured in a line with the ventrals. Scales deciduous; on the sides, large, orbicular, with concentric and radiating striæ, festooned on the edges. Lateral line deeply concave, following nearly the abdominal outline. Head very small, scaleless; upper jaw longest; mouth opening upwards, toothless. Eyes large. Nostrils double; the posterior largest. Three flat branchial rays. Abdominal outline very convex, thin, cultrate.

The dorsal fin subquadrate, higher than long, highest in front; the first is a short spine, nearly hidden under the skin, about three lines in length; the second and third successively longer, and simple; the fourth longest, and with the remainder branched, and gradually diminishing to the last. This fin is placed over the space between the ventral and anal, its last ray being nearly over the first of the anal fin. Pectorals pointed, feeble, and with fifteen rays. Ventrals long, pointed, and nearly equidistant between the snout and the end of the body. Anal longer than high; its margin excavated; the first rays longest, the last higher than the penultimate ray; the first two rays simple. Caudal forked, with pointed lobes.

Color. Back, dorsal and caudal fins greenish. Upper part of the head dark brown, with metallic green behind the orbits. Irides pale yellowish; beneath the orbits, pearly. Opercles brilliant yellow, which disappears shortly after being taken from the water. Pectorals and ventrals with faint orange tints. Sides of a brilliant lustrous white, which has suggested the popular name.

Length, 5·0. Depth, 1·3.
Fin rays, D. 10; P. 15; V. 10; A. 14; C. 19 $\frac{2}{2}$.

This beautiful little fish, which is usually much smaller than the one whose dimensions are given above, is common in all the fresh-water streams of this and the adjoining States. Its

geographical limits are not ascertained. Richardson (Vol. 3, p. 122) describes one from Lake Huron, under the same name, which must be a different species.

I have ventured to construct a new genus for the reception of this species. The deep body, small head, cultrate abdomen and dorsal spine, clearly show that it can be arranged with no previously described genus of this family. The name alludes to its silvery lustrous appearance.

GENUS LEUCISCUS. *Klein.*

The dorsal and anal fins short, without strong rays at their commencement. No cirri, nor barbels on the head. The dorsal either above the ventrals, or between these and the anal.

THE BLACK-NOSED DACE.

LEUCISCUS ATRONASUS.

PLATE XXIII. FIG. 69.

The Brook Minnow, Cyprinus atronasus. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 460.
Leuciscus atronasus, The Brook Minnow. STORER, Massachusetts Report, p. 92.

Characteristics. Small, with a broad black longitudinal band. Tail forked. Length one to three inches.

Description. Body oblong, cylindrical, tapering. Head small, flattened. Scales moderate, orbicular, and, under the lens, exhibiting concentric and radiating striæ; towards the tail they become oblong. Lateral line straight, composed of a double series of tubes, and running along the lower margin of the dark longitudinal band. Eyes rather large, with black pupils and golden irides, the lower portion being darkest. Nostrils large, oval. Mouth small; the under jaw shortest. A few sharp incurved teeth in the pharynx.

The dorsal fin higher than long, subquadrate, slight, emarginate above; the rays successively shorter to the last. It arises nearly equidistant between the extremity of the caudal fin, and the tip of the snout; its first ray is slightly in advance of the ventrals. The pectorals are placed very low, fan-shaped, and with very minute rays. Ventrals feeble, and very closely approximated to the anal, which latter equals in length some of the longest rays of the dorsal fin; the third and fourth rays longest. This fin is quite remote from the caudal, which is deeply forked, and with numerous accessory rays.

Color. Body above greenish; summit of the head blackish brown. A broad dark brown or blackish band passes from the nose, including the lower half of the eyes, and proceeds in a straight line to the tail; bordering this above, is a light yellow line, which, however, commences only from the gill-covers: this is occasionally inconspicuous. Under the lens, the scales appear minutely punctate with brown. Abdomen silvery, with a few brownish and metallic blotches. Pectorals orange. Dorsal and caudal dark brown.

Length, 3·0. Depth, 0·5.
Fin rays. D. 8; P. 15; V. 8; A. 8; C. 19 $\frac{3}{3}$.

The dimensions given above, are from one of the largest size. It inhabits clear fresh-water streams and rivulets, and is found abundantly in this and the adjoining States.

THE SPAWN-EATER.

LEUCISCUS HUDSONIUS.

PLATE XXXIV. FIG. 109. — (STATE COLLECTION. CAB. LYCEUM.)

Clupea hudsonia. CLINTON, Ann. Lyc. Nat. Hist. N. Y. Vol. 1, p. 49, pl. 2, fig. 2.

Characteristics. A broad longitudinal silvery band along the sides, and a black spot on the base of the caudal fin. Length three to six inches.

Description. Body subcompressed, cylindrical; dorsal outline somewhat arched near the dorsal fin. Abdomen convex. Scales very deciduous, vertically oblong; margins entire. Lateral line straight. Head small, flattened above. From above the nostrils, the facial line descends rather abruptly, producing a blunted nose. Eyes large; the upper margin of the orbits near the facial outline; orbits 0·3 in diameter. Nostrils double, contiguous; the posterior largest, sublunate; and both vertical, in a line with the upper margin of the orbits. Opercles obtusely rounded, with a narrow membrane on its margin; near the upper angle, a flat curved and pointed scale. Length of the head to that of the body and tail, as one to six nearly. Branchial aperture large. Jaws toothless; the lower shortest. Branchial arches with short pectinations.

The dorsal fin trapezoidal, placed immediately above the ventrals, composed of one long simple and seven successively shorter branched rays. Pectorals long and pointed, containing fifteen rays. Ventrals with one simple and seven branched rays; their tips nearly reaching the anal. Anal higher than long, Caudal forked; the lobes equal.

Color. Opercles silvery. A lustrous silvery band 0·1 broad, extends from the upper angle of the opercle to the base of the tail, where there is a deep roundish black spot. Pupils black; irides silvery.

Length, 4·5; of the head, 0·8.
Fin rays, D. 8; P. 15; V. 8; C. 19 $\frac{6}{6}$.

This species was originally noticed by Mr. I. Cozzens, in a catalogue which we drew up together many years ago. In that list, he called it *Stolephorus hudsonius*, but the description remained in manuscript. The first published description of this beautiful fish was by a former Governor of this State, DE WITT CLINTON, in the Annals of the Lyceum above referred to. It is called *Spawn-eater*, from an idea entertained by fishermen that it lives exclusively on the spawn of other fishes. It is not uncommon in the Hudson river and its tributaries.

THE RED-FIN.

LEUCISCUS CORNUTUS.

PLATE XXIX. FIG. 92.

Cyprinus cornutus, The Red-fin or *Rough-head.* MITCHILL, Am. Month. Mag. Vol. 1, p. 324.

Characteristics. Opercles, and the margins of all the fins, bright crimson. Numerous tubercles on the head. Length three to six inches.

Description. Body symmetrical, cylindrical, tapering; greatest depth anterior to the dorsal fin, where the back is slightly arched. Scales large, oblong vertically, with concentric and radiating striæ and entire margins. Lateral line gently concave from its origin until it reaches a point below the termination of the dorsal, and then proceeds straight throughout; it is composed of a series of single tubes. Summit of the head covered with numerous minute pointed tubercles, (in some individuals, extending as far back as the dorsal fin.) These are also to be seen on the sides of the snout, and form a regular series along the sides of the lower jaw. They have a rounded, extended, and somewhat depressed base. Eyes moderate. Lower jaw rather shortest. Nostrils double, contiguous; the posterior largest. Air-bladder double; the anterior short and cylindrical; the posterior longest, and pointed behind.

The dorsal fin quadrate, higher than long, originating above the commencement of the ventrals, composed of eight rays, of which the anterior is longest, and thence gradually diminishing to the last. Pectorals placed low down, broad, and obtusely pointed; their tips reach to within three-tenths of the ventrals. Ventrals rounded, and beneath the dorsal. Anal broader at base than high; its anterior rays longest, and its margin broadly excavated. It commences beneath a point reached by the tip of the dorsal when recumbent. Caudal forked, with many accessory rays.

Color. Above blackish brown, with metallic reflections; sides brilliant cupreous. Opercles sometimes brassy, occasionally deep bronze. Dorsal and caudal darkish brown; the former sometimes mottled with darker clouds. Ventrals and pectorals light-colored; the first rays of the pectoral fin deep brown, which occasionally tinges the central portion of the rays. All the fins broadly margined with deep crimson; the lower part of the opercles and base of the pectorals tinged with the same color. Humeral bone deep blackish brown. Abdominal cavity lined with a silvery pigment.

Length, 5·2. Head, 1·0.
Fin rays, D. 8; P. 15; V. 8; A. 9; C. 19 $\frac{7}{7}$.

This very beautiful little fish was first noticed by me in Indian lake, Hamilton county; subsequently in Lake Janet, and in most of the streams in the northern parts of the State. Dr. Mitchill describes it from Westchester county. It is exceedingly lively and active in its movements; is usually found in clear limpid streams, associated with the Brook Trout. It

has the various popular names of *Red-fin*, *Red Dace*, and *Rough-head*. It appears to be allied to the *L. pulchellus* of Storer.

THE ROACH DACE.

LEUCISCUS PULCHELLUS.

Leuciscus pulchellus, The Beautiful Leuciscus. STORER, Massachusetts Report, p. 91.

Characteristics. Brown above; lighter on the sides. Dorsal nearly as high again as long. Length fourteen inches.

Description. Back slightly arched; the arch on the top of the head very slight. Scales large, small on the back and smaller on the throat; transparent, rounded at the summit, truncated at their base, exhibiting numerous striæ. At the base of each scale, a fleshy dark colored membrane, which, projecting as far as the apex of the preceding scales, gives the appearance of indistinct oblique bands across the fish. The lateral line commences at the upper angle of the branchial aperture, curves downward nine scales, and goes off straight; it is composed of fifty-nine scales. Nine above the lateral line, in an oblique line from the origin of the dorsal fin, and six below. Head naked; distance between the eyes equal to one-third the length of the head. Nostrils placed higher than the eyes, and in front of them; the posterior largest, the anterior tubular. Jaws without teeth. Upper jaw juts slightly over the lower.

The dorsal fin arises on the anterior half of the body; the first ray one-fourth the height of the second. Pectorals rounded. Ventrals beneath the dorsal, shorter than the pectorals. Anal arises 0·75 behind the dorsal, and is higher than long; the first ray one-fourth the height of the second. Caudal large, three inches wide when expanded.

Color. Back dark brown; sides and abdomen flesh-colored, with metallic reflections. Head bluish above; gill-covers silvery, with metallic tints and a brown membranous prolongation. Dorsal brown with reddish. Pectorals brownish above; lighter beneath. Ventrals and anal light-colored.

Length, 14·0.
Fin rays, D. 10; P. 17; V. 8; A. 10; C. 22.

According to Dr. Storer, this species is found in the Eastern States, where it is called *Roach* and *Cousin Trout*.

THE SHINING DACE.

LEUCISCUS NITIDUS.

PLATE XXXIII. FIG. 105 — (STATE COLLECTION.)

Characteristics. Body silvery white. Head with mucous pores. Tail deeply emarginate, not furcate. Length two to ten inches.

Description. Body rather deep, compressed, elongate. Scales large, caducous, orbicular; the free margins festooned with elevated radiate striate lines, the intervals being concentrically striate; the scales ascend some distance up the caudal fin. There are seven scales in an oblique line from the first dorsal ray to the lateral line, and five below. Forty-six were counted along the lateral line, which is curved downward, and concurrent with the abdomen. Head small, smooth and scaleless; flattened above, with a curved series of mucous pores on each side above the eyes, extending to the nostrils, and are apparently continuations of the lateral line. Eyes moderate, 0·3 in diameter and 0·65 apart. Length of the head 1·6. Nostrils contiguous; the posterior largest, with a valvular membrane. Snout blunt; under jaw shortest, both edentate. Sharp teeth in the pharyngeals. Tongue conspicuous, attached, with transverse rugæ. The same rugæ, with slightly pectinated margins, in the roof of the mouth. Stomach capacious. Air-bladder double; the posterior portion longest.

The dorsal fin quadrate, higher than long, and commencing rather nearer the end of the snout than to the base of the caudal; the anterior ray longest. Pectorals small, slender and pointed, placed below the angle of the opercle. Ventrals beneath the dorsal; the second and third rays longest. The anal commences half an inch behind the tips of the ventrals, emarginate, with its second and third rays longest. Caudal fin deeply emarginate, not forked.

Color. Upper part of the head and body olive brown; the former darker. Sides silvery. Pupil black, with a silvery ring. Gill-covers lustrous silvery. Pectoral fins tinged with light yellow, reddish on its inner base. Dorsal and caudal fins brownish. On the small specimens only did we notice a bright greenish stripe above the lateral line, which appeared only in certain lights.

Length, 2·0 – 10·0.
Fin rays, D. 8; P. 16; V. 10; A. 9; C. 19 $\frac{1}{3}$.

This species was taken in July, in Lake Champlain, where it appeared to be common. It was called there, *White Dace* and *Shiner*.

THE BLACK-HEADED DACE.

LEUCISCUS ATROMACULATUS.

PLATE XXXII. FIG. 102 — (STATE COLLECTION.)

The Mud-fish, Cyprinus atromaculatus. MITCHILL, Am. Month. Magazine, Vol. 2, p. 324.

Characteristics. Back anterior to the dorsal, with a depression in the vertebral line. Lips fleshy. A dusky longitudinal band. Length six to twelve inches.

Description. Body cylindrical, tapering, subcompressed. Scales large, suborbicular, with radiating and concentric striæ. Lateral line distinct, arising from the upper angle of the opercle, curving downward to the twelfth row of scales, then slightly rising under the middle of the dorsal fin, and going off straight. The anterior portion of the back flattened, with a depression in the centre, extending nearly to the dorsal fin. Head sloping, smooth and scaleless. A series of mucous pores over each eye, extending to the nape; this is only apparent in the larger individuals. Nostrils in a cavity; the posterior large and patent; the anterior nearly closed by a valvular margin. Mouth terminal, very large. Lips somewhat fleshy, with a very slight roughness on the jaws.

The dorsal fin arises nearly in the centre of the body, quadrate, higher than long; the second, third and fourth longest. The pectorals are placed low down, and may be described as low and pointed. Ventrals half an inch anterior to a line vertical from the origin of the dorsal. Anal higher than long, arising two-tenths of an inch behind a line vertical from the end of the dorsal. In this specimen, this fin was 0·8 long. Caudal fin lunate.

Color. Body above dark olive-green, with a broad darker longitudinal band extending from the gill-covers to the tail. In the larger individuals, this color extends, as in *atronasus*, through the eyes, and to the tip of the snout. Flanks of golden yellow. Beneath silvery white. Head deep brownish black. Gill-covers cupreous, with metallic reflections. The black color of the head descends down along the margin of the gill-cover, to the base of the pectoral. Eyes black, surrounded by a golden ring. Dorsal fin with a dark spot at the anterior portion of its base. Pectorals, ventrals and anal with a light orange tint.

Length, 10·0; of the head, 1·5. Depth, 1·2.
Fin rays, D. 9; P. 15; V. 8; A. 9; C. 18 $\frac{5}{5}$.

This species is very common in the lakes in the northern counties of the State, and varies much in size. They are popularly termed *Lake Chub* and *Lake Dace*. I refer this, notwithstanding the discrepancies in the enumeration of the fin rays, to the *Mud-fish* of Dr. Mitchill, which he describes from the Walkill. His specimens were six inches long.

THE BAY SHINER.

LEUCISCUS CHRYSOPTERUS.

PLATE XXX. FIG. 95. — (STATE COLLECTION.)

Characteristics. Ventrals with an accessory scale. Dorsal emarginate. Length four to six inches.

Description. Body elongate, tapering, subcompressed. Scales large, subequal. Number of scales in a transverse series to the ventrals, seven above and six below the lateral line. There are about forty-five in a longitudinal series. They are rounded, the free margins entire; exposed surface with six or seven elevated radiating striæ, with minute intermediate concentric striæ; middle of the base of each scale produced, with eight or nine radiating plaits. Lateral line curved downward below the middle of the body opposite the ventrals, thence rising and going off straight, but somewhat below the medial line. Head scaleless, pointed, smooth, flattened above. The opercular bones smooth, lustrous silvery. Humeral bone broad, triangular, shining. Eyes large, 0·3 in diameter, and rather more than their diameters apart. The anterior nostril circular, with an elevated margin nearly covering the posterior aperture. Snout blunt. Mouth small, toothless.

The dorsal fin arises nearly half an inch farther from the snout than from the base of the caudal; it is half an inch long, and slightly exceeding this in height; quadrate, slightly emarginate above; the first ray shortest, the two first simple; of nine rays, the last bifid. Pectoral acuminate, placed low down, slightly behind the gill opening, its tip reaching to within half an inch of the base of the ventrals; its own base oblique, the lower rays very minute. Ventrals broad, rather contiguous, composed of one simple and eight branched rays; they arise a tenth of an inch in advance of the first dorsal ray, with a pointed accessory scale at the base; they reach to within 0·2 of the vent, which is placed just before the anal fin. This latter fin of two simple and eight branched rays, broadly emarginate above. Caudal deeply lunate; the membrane of the middle rays translucent.

Color. A general silvery color, with a darker hue above. Fins yellowish. I have not given a colored figure of this species, as I had not a sufficiently fresh specimen from which to make the drawing.

Length, 6·0. Depth, 1·2.
Fin rays, D. 9; P. 19; V. 9; A. 10; C. 19 $\frac{6}{6}$.

This beautiful species is caught in the harbor of New-York, and is popularly called *Bay Shiner*, or simply *Shiner*. It is allied to *L. nitidus*, a fresh-water species already described. It appears to have some relations with the family of the Clupidæ.

THE SILVERY DACE.

LEUCISCUS ARGENTEUS.

Leuciscus argenteus, The Silvery Leuciscus. STORER, Massachusetts Report, p. 90.

Characteristics.

Description. Body elongate, but very slightly arched over the neck and at the dorsal fin. Head without scales. On the body, nine moderate sized scales in an oblique line from the origin of the dorsal to the lateral line, and four beneath. The lateral line commences on the sides of the snout, and passing back under the eyes, and up over the posterior angles of the gill-covers, curved downward until opposite the middle of the pectorals, and thence straight. Head flattened above; distance between the eyes 0·5; their diameters 0·25. The posterior nostril oblique and largest. Jaws toothless; upper jaw longest. The dorsal fin arises on the anterior half of the body, higher than long; the first half as high as the second. Pectorals elongated, as high as the dorsal. Ventrals directly beneath the dorsal. Anal 0·25 behind the ventrals; its length to its height as two to three. Caudal deeply forked.

Color. General color silvery; rather darker on the back, head above bluish. Opercle cupreous; exterior to the opercle, a narrow dark band encircles the head from the base of the pectorals, and separating the head from the body. Preopercle inclining to flesh color. Dorsal fin dark colored; the others lighter.

Length, 6·0.
Fin rays, D. 9; P. 16; V. 8; A. 9; C. 20.

I am indebted to Dr. Storer for the description of this Dace, from the adjoining State of Massachusetts.

THE BANDED DACE.

LEUCISCUS VITTATUS.

PLATE XXXIV. FIG. 108.—(STATE COLLECTION.)

Characteristics. Olive-green, with a golden dorsal stripe; silvery beneath, tinged with flesh-color. Length two to four inches.

Description. Body subcylindrical, tapering, subcompressed. Scales moderate, with membranous margins. Lateral line descends with a curve, and rises under the posterior part of the dorsal fin to the middle of the body. Head rather depressed, scaleless, with several series of mucous pores. Eyes large. Mouth small, terminal, toothless; a few teeth in the pharynx. Three branchial rays. Air-bladder double; the anterior short, cylindrical; the posterior longer, pointed behind. Dorsal fin quadrate, higher than long; its first ray simple, the second longest; its articulated ray quadrifid. Pectorals pointed, subfalcate, placed very

low down. Ventrals broad and rounded, beneath the dorsal. Anal similar in shape to the dorsal, but not so high; its upper edge slightly emarginate. Caudal deeply forked.

Color. Body above light-olive green, with a golden dorsal stripe extending to the tail. A faint broad yellowish stripe along the sides, which in certain lights assumes a darker hue. Abdomen silvery, tinged with salmon-color. Pupils black; irides light brown. Summit of the head olive-brown. The fins yellowish, translucent.

Length, 4·0. Depth, 0·8.
Fin rays, D. 9; P. 15; V. 8; A. 8; C. 19 $\frac{4}{4}$.

This small species is very common in the Chittenonda and other tributaries of the Mohawk. In the latter stream, they are abundant in the "pot-holes," or circular cavities made in its limestone bed.

THE CORPORAALEN.

LEUCISCUS? CORPORALIS.

Corporal, Cyprinus corporalis. MITCHILL, Am. Month. Mag. Vol. 2, p. 324.

Description. Head smooth, roundish, thick, and without scales. Body thickly covered with scales: On the back, more especially between the head and dorsal fin, the hue is dusky; on the belly, it is uniformly white; and on the sides, the fore part of each scale is covered with a blackish film or pigment. Mouth toothless, and of a moderate gape. Tongue distinct, not free. Gill-covers smooth. Tail forked; the lateral line bends downwards and ends in the middle of the tail. Branchial rays three. Dorsal fin near the middle of the back, and consists of seven rays; caudal of nineteen, or thereabouts; the anal seven; the ventral seven; pectorals thirteen; the dorsal and caudal fins tipped with blackish. Length of a middle sized individual about thirteen inches, though he frequently grows larger. Inhabits the Hudson in the neighborhood of Albany, the Walkill through its whole extent, and the western streams and lakes from Wood creek to the Oneida lake, and so on. Takes the hook, if baited with dough, when let down through holes in the ice, at mid-winter, in the Hudson at Albany. Flesh eatable, but rather soft and coarse.

I have copied this brief account of a fish which, according to Dr. Mitchill, is common in almost every part of the State, but which it has not yet been my good fortune to meet with. I solicit the attention of ichthyologists to this species, which, if it should prove to be a *Leuciscus*, is one of the largest of the genus.

THE PIGMY DACE.

LEUCISCUS PYGMÆUS.

PLATE XLII. FIG. 134. — (STATE COLLECTION.)

Characteristics. Very small. One or more black ocellate spots on the base of the oblong pointed tail. Length one inch.

Description. Body oblong, cylindrical; abdomen somewhat prominent. Lateral line concurrent with the back. Scales soft, large in proportion to the size of the body, extending over the cheeks, and to a line with the anterior margin of the orbits. Head flattened, the facial line descending to the snout. Eyes large, and rather more than their diameters apart; orbits prominent. Nostrils inconspicuous. Mouth small, edentate; lower jaw somewhat longest. The dorsal fin long, emarginate, and over the ventrals and anal. Pectorals low down, pointed, with excessively minute rays. Ventrals with six rays, ending in filiform points. Anal coterminal with the dorsal. Caudal long, lanceolate.

Color. Head and back uniform dark brown or black above, and lighter towards the abdomen; reticulations of the scales darkish. Pupil black; irides light-colored. On each side of the tail a black spot, margined with white; occasionally two of these spots on each side, surrounded by a common ring. Rays of the vertical fins annulate with brown.

Length, 1·0.
Fin rays, D. 14; P. 16; V. 6; A. 13. C. 17.

The scaly head, long dorsal and filiform ventrals, evidently indicate a new form, distinct from *Leuciscus*. In a general systema, it must be the type of a new genus. It is the smallest of the American Cyprinidæ, the above being of the largest size. It occurs in brooks near Tappan, Rockland county, from whence it was obtained by Mr. John G. Bell. They are very active, ascend high up the sources of the smallest streams, and are frequently left in shallow pools dried up by the sun.

(*EXTRA-LIMITAL.*)

L. elongatus. (KIRTLAND, Bost. Jour. Vol. 3, p. 339, pl. 4, fig. 1.) Sky blue. Back edged below with a golden band, which is margined beneath by an interrupted black stripe; beneath this a carmine stripe, ending opposite the ventrals. Length three inches. *Tributaries of Lake Erie.*

L. dissimilis. (ID. Ib. fig. 2.) Head flat between the eyes; nose prominent. Back brownish or olive. A golden stripe along the lateral line, with about twelve bluish dots. *With preceding.*

L. biguttatus. (ID. Ib. pl. 5, fig. 1.) A large vermilion dot behind each eye. A black spot at the base of the caudal. Allied to cornutus. Length six inches. *Ohio.*

L. cephalus. Chub Big-head. (ID. Ib. pl. 5, fig. 2.) Head often with spines. Silvery; back brownish. Dorsal with a large black spot at the anterior base. D. 9; A. 9. Length six to eight inches. *Ohio.*

L. caurinus. (RICHARDSON, F. B. A. p. 304.) Moderately compressed. Scales orbicular; seventy-five on the lateral line, twenty-four in a vertical line. Caudal deeply forked. D. 10; A. 9. Length 12½ inches. *Columbia River.*

L. oregonensis. (ID. Ib. p. 305.) Brownish grey; belly silvery white. More elongated than the preceding; head longer. Length thirteen inches. *Columbia River.*

Genus PŒCILIA, *Schneider.* Body little elongated. Jaws flattened, protractile, and but slightly cleft, with a single row of very small teeth. Opercles large, five-rayed. Dorsal above the anal.

P. multilineata. (LESUEUR, Ac. Sc. Vol. 2, pl. 1.) Compressed. Several longitudinal series of black spots. Dorsal small, longer than high. Caudal straight. D. 14; A. 9; C. 26. Length one and a half inches. *Florida.*

GENUS LEBIAS. *Cuvier.*

With many of the characters of the preceding. Teeth denticulated. Branchial rays five.

THE SHEEPSHEAD LEBIAS.

LEBIAS OVINUS.

PLATE XXVII. FIG. 84.

The Sheepshead Killifish, Esox ovinus. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 441, pl. 4, fig. 7.
Cyprinodon ovinus. VALENCIENNES, apud Humboldt, Obs. Zool. Vol. 2.

Characteristics. Elliptical, compressed, with transverse stripes or spots occasionally obsolete. Extremity of the tail pellucid.

Description. Body much compressed: its greatest depth equalling one-half of the length of the body and tail. Scales large, subquadrate, longest in their vertical diameter, rounded and entire on their free edges; at their radical edge, straight, with parallel horizontal striæ; on the summit of the head, a central scale, with its entire margin free. The scales extend over the cheeks, form an imperfect sheath for the dorsal, and extend far up the caudal fin, giving that pellucid appearance noted in the specific phrase. A large plate or bony scale above the base of the pectoral fin. Lateral line scarcely obvious. The head slopes rapidly down from before the dorsal fin, and is much flattened between the eyes, which are distant. Nostrils contiguous to the orbit. A number of mucous pores about the head and beneath the jaws. Opercular margin entire, rounded. Branchial rays five. Jaws protractile, with from sixteen to eighteen tricuspid teeth in each jaw.

The dorsal fin high and rounded, with eleven nearly subequal branched rays, and terminating over the commencement of the anal rays. Pectorals pointed, placed low on the body, with its middle rays longest, and extending to the seventh dorsal ray. Ventrals very feeble, of seven very closely applied rays, with their tips extending to the anal. Anal fin higher than long. Caudal fin broad and short, nearly even; its margin slightly excavated.

Color. Back dark green, becoming lighter towards the sides, with numerous spots disposed in vertical series, often becoming confluent in interrupted bars. Irides yellow. Fins light brown.

Length, 2·2. Depth, 0·8.
Fin rays, D. 11; P. 15; V. 7; A. 10; C. 15 $\frac{5}{5}$.

Dr. Mitchill first described this small species as an *Esox*. M. Valenciennes, in his elaborate Memoir on the Fishes of Equinoxial America, arranged it under the genus *Cyprinodon*. The *Lebias rhomboidalis* of that author also appears strikingly allied to our species.

These minute inhabitats of the salt and brackish streams in the neighborhood of New-York, possess slight economical value. They are, with other small fishes, used as bait.

(*EXTRA-LIMITAL.*)

L. ellipsoides. (LESUEUR, Ac. Sc. Vol. 1, p. 6.) With a series of large scales on the back and upper part of the head. Caudal fin obliquely truncated. Teeth ending in 3 – 4 points. Length two inches. *Florida.*

GENUS FUNDULUS. *Lacépède, Valenciennes.*

Body oblong, tapering, with large scales. Head depressed, scaly. Teeth in both jaws, numerous; the first row acute and largest. Stout conical teeth in the pharynx. Four branchial rays.

THE STRIPED KILLIFISH.

FUNDULUS FASCIATUS.

PLATE XXXI. FIG. 98. — (STATE COLLECTION.)

May-fish. SCHŒPFF, Beobachtungen der Naturfors. Vol. 8, p. 173.
Pœcilia fasciata. SCHNEIDER, fide VALENCIENNES.
Hydrargyre swampine. LACEPEDE.
Esox flavulus, New-York Gudgeon. MITCHILL, Lit. and Phil. Soc. p. 439, pl. 4, fig. 8.

Characteristics. Sides brassy yellow tinged with green, with 12 – 18 blackish bars often obscure, and 2 – 5 irregular longitudinal stripes; the bars on the tail persistent.

Description. Body oblong, subcompressed. Head depressed; its facial line horizontal. Scales large, subquadrate, rounded on the free portion, concentrically striate; radical portion truncate, with deep plaits in the central portion, its angles produced. Mouth opening obliquely upward; lower jaw jutting and longest. Orbits large; their upper margins in the plane of the facial line. Crowded and pointed teeth in the jaws; similar teeth in close rows on the pharynx. The dorsal fin high, and slightly rounded above; placed on the posterior part of the

body. Pectorals broad and pointed. Ventrals small; their tips reaching nearly to the vent. Anal long, placed under the posterior part of the dorsal. Caudal oblong, rounded.

Color. Dusky greenish on the back; darker on the head above. Sides brassy yellow tinged with green, becoming lighter beneath. Along the sides are faint indications of dusky bars, which, on the tail, become distinctly marked black bars, or lines of interrupted black dots. There are also from two to five irregular longitudinal dusky stripes of various lengths; more usually two short interrupted stripes, and two longer continuous stripes, which usually stop short near the distinct caudal bars. Dorsal and anal with numerous white dots.

Length, 1·0 – 3·0.
Fin rays, D. 14; P. 15; V. 6; A. 11: C. 23.

This little fish presents much variety in its markings: the transverse bars on the sides of the body are frequently obsolete; the stripes are irregular and often obsolete, their places being indicated by dots or abbreviated lines. In all the specimens which I have seen, the black bars across the tail were always persistent, and this is perhaps its most striking characteristic.

This species abounds in all our salt-water creeks and bays. Its popular name is derived from its abundance in creeks and estuaries, which our Dutch ancestors termed "kills." It is used merely as bait for other fishes. From the similarity of name, I should almost be inclined to suspect this to be the *Cobitis maialis* of Schneider, which is cited by Valenciennes as a synonime of his *Cyprinodon flavulus*.

THE BIG KILLIFISH.

FUNDULUS VIRIDESCENS.

PLATE XXXI. FIG. 99.

Killfish. SCHŒPFF, Beobachtungen der Naturforsch. &c. Vol. 8, p. 172.

Characteristics. Greenish above; pale beneath, without stripes or bars. Caudal nearly even, rounded. Length 3 – 5 inches.

Description. Body elongate, cylindrical, flattened above, and much compressed on the sides of the tail. Scales large, orbicular, with strongly impressed concentric striæ; very large on the head, extending to the end of the snout, and covering the opercles. A central one on the summit of the head, with its entire margin free. Lateral line obscure. Head very small, flattened above. Eyes large, distant. Nostrils form an oblong slit just anterior to the orbits, and in a line with their upper margin. Several mucous pores about the head and along the base of the preopercle. Mouth small, protractile, with a somewhat vertical aspect. A single row of long slender crowded subequal and slightly recurved teeth in front on the lower jaw, and several series of minute teeth behind; a similar disposition in the upper jaw. Two round patches of blunt teeth in the pharynx.

The dorsal fin placed far back, quadrate, longer than its base, of eleven subequal rays, and placed over the anal. Pectorals obtusely pointed, 0·6 long, and containing seventeen very slender rays. Ventrals feeble, distant, and nearly in the centre of the body. Anal 0·5 long, composed of eleven rays, of which the middle are longest. Caudal fin broad and short, slightly rounded, and with its numerous accessories comprising twenty-nine rays.

Color. Olive-green above; lighter on the sides, and becoming whitish, tinged with yellowish, on the abdomen. Opercles, pectorals and ventrals light greenish yellow. Irides yellow.

Length, 3·0 – 5·0. Depth, 0·4 – 1·0.
Fin rays, D. 11; P. 17; V. 6; A. 11; C. 29.

I cite but one synonime, although I am inclined to suspect that this may be the fish intended by Dr. Mitchill as *Esox pisciculus;* but his description is not sufficiently precise to enable me to pronounce it to be the same with any certainty. M. Valenciennes, apud Humboldt, supposes this *pisciculus* to be the adult of his *Fundulus fasciatus.*

This fish is known under the names of *Minny* (minnow), and more generally of *Big Killie.* It abounds in the salt-water creeks and brackish streams in the neighborhood of New-York.

THE BARRED KILLIFISH.

FUNDULUS ZEBRA.

(CABINET OF THE LYCEUM.)

Characteristics. Fifteen to twenty narrow vertical lines over the body. Dorsal and anal punctate with white. Length 2 – 4 inches.

Description. Body oblong, compressed; dorsal outline, anterior to the fin, forms a slight curve, gently sloping to the snout. Scales rounded, and sparsely ciliate on the free margins; radical margin straight, with parallel striæ; scales large on the head and opercles, extending far up on the base of the caudal fin. Lateral line not obvious. Summit of the head broad and flat. A short series of mucous pores anterior to the eyes. Mouth with a somewhat vertical aspect. Jaws protractile, furnished with a series of distant recurved teeth; and behind this, others smaller and crowded. Pharynx with stout teeth.

The dorsal fin quadrate, over the anal, with its posterior ray longest. Pectorals small, scarcely pointed, with the middle rays longest. Ventrals feeble. Anal fin very high, the penultimate rays extending nearly to the accessory rays of the caudal. This latter fin rounded, almost pointed.

Color. Body brownish green, with numerous narrow white lines or spots (forming interrupted lines), dividing the dark colored sides of the body into many dark colored bars. With these are numerous silvery white and steel-blue dots, giving a singularly beautiful and striped appearance to the fish; these dots extend over the dorsal and anal fins.

Length, 4·0. Depth, 0·3.
Fin rays, D. 10; P. 17; V. 6; A. 10; C. 19 $\frac{5}{5}$.

To this, and various other allied species, is applied the indian name of *Mummachog*. Like its congeners, it is found in the salt-water creeks about New-York. Dr. Holbrook informs me that it is common in the brackish streams of Carolina.

GENUS HYDRARGIRA. *Lacépède, Lesueur.*

Head flat, shielded above by large scales; the central scale largest. Teeth in the jaws and throat; those in the jaws conic. Scales on the opercles. Branchial rays four to five.

Obs. M. Lesueur has attempted to renovate a defective genus proposed by Lacépède, but it does not appear to be well elaborated, and has not been adopted by modern ichthyologists. When better studied, it may serve to embrace numerous small fresh-water Cyprinidæ, which are not yet well established in the systems.

THE TRANSPARENT MINNOW.

HYDRARGIRA DIAPHANA.

Hydrargira diaphana. Lesueur, Journ. Ac. Sc. Vol. 1, p. 130.

Characteristics. Body diaphanous, with sixteen transverse brown bands, confluent above. Dorsal fin double the size of the anal. Length 3 – 5 inches.

Description. Body subcylindric, fusiform; head cuneiform; snout elongated; lower jaw straight; back nearly straight. Eyes large, sub-oblong. Dorsal, anal and pectorals roundish; ventrals very small, roundish, situated midway between the anal and pectoral fins; caudal truncate.

Color. Back and upper part of the head brown olive; lower parts white. Sides with delicate blue tints. Opercles with brilliant yellow and blue reflections.

Length, 5·0. Depth, 0·6.
Fin rays, D. 13; P. 18; V. 6; A. 12; C. 18 $\frac{5}{5}$.

This is described by Lesueur from Saratoga lake, where it is used as a bait for other fishes.

THE BARRED MINNOW.

HYDRARGIRA MULTIFASCIATA.

Hydrargira multifasciata. LESUEUR, Journ. Acad. Nat. Sc. Vol. 1, p. 131.

Characteristics. Fifty transverse bands on the sides, alternately olive brown and blue. Dorsal and anal nearly equal. Length three inches.

Description. Body more elevated in the middle than in the preceding, and less transparent. Snout shorter, and ventrals larger. Dorsal and anal fins almost equal, the latter pointed. Pectorals with their tips passing beyond the base of the ventrals. Eyes rounded.

Length, 3·0.
Fin rays, D. 14; P. 18; V. 6; A. 12; C. 16 $\frac{5}{5}$.

This species, according to M. Lesueur, is also found in Saratoga lake. It may prove to be the young of the preceding.

THE CHAMPLAIN MINNOW.

HYDRARGIRA ATRICADA.

Characteristics. Olive-brown, with a broad black stripe across the tail. Length two to three and a half inches.

Description. Shape that of the *F. viridescens*, represented on Plate 31, fig. 99. Back nearly straight, flat and slightly depressed in front of the dorsal fin. Head flattened above, slightly descending to the pointed snout. Scales large, orbicular, with impressed concentric striæ, rounded on the head above, distributed over the opercles, and elongated where they cover the base of the caudal fin. Thirty-six were enumerated along the lateral line. Numerous mucous pores about the head and on the opercles. Two contiguous and near the posterior margin of the orbits; and behind these, two others in an obliquely descending line. Three pair between the orbits, and others before the eyes, on the cheeks, and the branches of the lower jaw. Nostrils double; the posterior largest. Eyes large, near the snout, with the upper margin of the orbits in the facial line. Opercle large and rounded. Five branchial rays, of which the three upper are broad and flattened. Mouth small; tongue long, thin, and enlarged at the end. Teeth in the lower jaw, numerous, minute, acute, and much recurved; in a single series on the sides, and double in front. In front of the upper jaw, a small patch of minute teeth. Asperities in the pharynx. Air-bladder large.

The dorsal fin of fifteen rays, higher than long, placed far back, and commencing nearly above the origin of the ventrals. The first short, 0·1 long; the second much longer; the third longest, and subequal with the remainder; it is coterminal with the anal. Pectoral obtusely pointed; the middle rays longest, the axillary cavity deep, with slender rays, their

tips reaching halfway to the base of the ventrals. Ventrals long, narrow and pointed, of six rays; their tips reaching to a little beyond the first anal ray. Anal narrow, higher than the dorsal, of ten rays; the first two short and simple, the remainder articulated and branched. Caudal long and rounded.

Color. This appears to have been olive-brown, with numerous transverse bars across the body and tail. A distinct black line in the course of the lateral line. Across the tail, on each side, about one-tenth of an inch from the base of the caudal fin, is a broad black bar, which appears to have been bordered with lighter in the recent specimen. Fins light olive-brown.

Length, 2·5. Depth, 0·4.
Fin rays, D. 15; P. 15; V. 6; A. 10; C. 12 $\frac{3}{3}$.

I have seen larger specimens, measuring 3·5 in length, with a depth of 0·6. For an opportunity of describing this species, I am indebted to Mr. Z. Thomson, of Burlington, Vermont, who has kindly favored me with other species.

(*EXTRA-LIMITAL.*)

H. ornata. (Lesueur, Ac. Sc. Vol. 1, p. 131.) Lower jaw short and curved. Back elevated. Dorsal clear blue, with yellow spots, and a larger deep blue spot. Sides blue, with sixteen transverse silvery stripes. D. 11; A. 12. Length 3 inches. *Delaware river.*

H. nigrofasciata. (Id. Ib. p. 133.) Dorsal and anal long and narrow. Fifteen black transverse bands; reddish yellow above. Caudal slightly rounded. Length 2–3 inches. *Salt marshes, Newport, R. I.*

Genus Molinesia, *Lesueur.* Anal between the ventrals, and under the dorsal. Teeth as in *Fundulus.* Branchial rays four or five.

M. latipinna. (Les. Ac. Sc. Vol. 2, pl. 3, fig. 1.) Reddish. Dorsal large and long, prolonged behind, in height equalling the depth of the body. Length 2½ inches. *Ponds, Louisiana.*

FAMILY ESOCIDÆ.

Body elongated. One dorsal, and generally opposite to the anal. Edge of the upper jaw either formed by the intermaxillaries, or if the maxillaries enter at all into its composition, they are destitute of teeth. Intestinal canal short, and generally without cæca. Branchial rays vary from three to eighteen. Mouth large, and with sharp teeth.

Obs. In this State, and along its shores, we describe the representatives of four genera. There are about ninety species, tolerably well known, in various parts of the world.

GENUS ESOX. *Cuvier.*

Head depressed, large, oblong, blunt. Intermaxillaries small, with small teeth at the middle of the upper jaw, of which they form two-thirds. The maxillaries forming the sides, have no teeth. Vomer, palatines, pharyngeals and branchial arches, bristling with card-like teeth. Sides of the lower jaw with a row of long pointed teeth.

THE MUSKELLUNGE.

Esox estor.

Pike, Pickerel or *Maskallonge, E. estor.* Lesueur, Journ. Acad. Sc. Vol. 1, p. 413.
E. Masquinongy. Mitchell, Mirror 1824, p, 297; Kirtland Zool. Ohio, p. 194.
E. estor. Cuvier, R. A. Ed. angl. Vol. 10, p. 389.
Maskinonge. Richardson, F. B. A. Vol. 3, p. 127.

Characteristics. Sides of the body with numerous rounded, distinct, occasionally confluent, lighter spots. Length one to three feet.

Description. Body cylindrical, elongate, somewhat quadrate. Scales thin, small, orbicular, ascending on the cheeks; the upper part of the head smooth; a series of about 160 along the lateral line, and 45 in a vertical row before the ventrals. Snout broad, rounded and depressed. Head covered with numerous pores on the summit and sides; its length to the total length, as one to four nearly. An oblong cavity between the orbits. Mouth very large. A single row of small recurved teeth in the anterior part of the upper and lower jaw; sides of the lower jaw with long acute distant teeth; bands of small teeth on the vomer and palatines; a series of minute teeth on the branchial arches. Tongue truncate, with asperities on its base. Branchial rays eighteen. The dorsal fin with twenty rays, of which the first five are applied closely to the base of the sixth. Anal similar in shape, with its first four rays similarly applied to the fifth. Pectorals small. Ventrals on the middle of the body, and small. Caudal large, lunulated with rounded lobes.

Color. Deep greenish brown; darker on the back; pale on the sides, with numerous rounded, distinct, pale yellowish or greyish spots on the sides. These spots vary in size

from two to three-tenths of an inch in diameter; they become occasionally confluent. Each scale has a bright quadrate spot, which reflects brilliant metallic tints of various colors.

Length, 12·0 – 48·0.
Fin rays, D. 21; P. 12; V. 11; A. 21; C. 19 $\frac{7}{7}$.

According to Mitchill, who describes a specimen 47·0 long and weighing 30 pounds, the fin rays are as follows:

D. 21; P. 14; V. 11; A. 17; C. 26.

The *Muskellunge*, or *Maskinongé*, for its orthography is not settled, occurs abundantly in Lake Erie, and is found also in the streams in the western district. My friend Dr. Pickering informs me that he saw them offered for sale at Montezuma (Cayuga county), where they were kept in a reservoir. They occur as far north as Lake Huron, where, however, they are rare. They are often caught by the seine. Dr. Kirtland speaks of them as being one of the best fish for eating, produced by the western waters. A specimen, he states, was taken in the canal near Massillon, which had found its way from Lake Erie. According to Lesueur, the name of this fish in the Wyandot dialect is *Thuhahresah han*.

The description of *E. estor* by the last named author, with the exception of a part of the specific phrase, applies, according to Richardson, exactly to *E. lucius*, and not at all to the true Muskellunge.

THE COMMON PICKEREL.

ESOX RETICULATUS.

PLATE XXXIV. FIG. 107.

The common Pike of North America. SCHŒPFF, Naturforschen, Vol. 2, p. 26.
The Pickerel, E. lucius, var. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 440.
Esox reticulatus. LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 414. *E. niger.* ID. var.
The common Pickerel, E. reticulatus. STORER, Massachusetts Report, p. 97.
Esox reticulatus, Pike. KIRTLAND, Zoology of Ohio, No. 41, p. 194.

Characteristics. Yellowish, with reticulated dark marks on the sides. Abdomen white, tinged with pink. Caudal deeply emarginate. Length one to three feet.

Description. Body subcylindrical, elongate. Scales small, emarginated. Snout blunt; the upper jaw smooth, broad, depressed, shorter than the lower jaw. Branchial rays seventeen. A few very small teeth on the intermaxillaries, in front of the upper jaw; sides toothless. On the lower jaw, in front, short small recurved teeth; but on the sides they are longer, distant, and slightly compressed. Palatines bristling with teeth, directed backward and inward; those on the interior edges of the palatines, much longer. Base of the tongue, branchial arches and pharyngeals with card-like teeth directed inward. Mouth large; nostrils in a groove. A few orifices of mucous ducts scattered over the summit of the head. The dorsal fin subquadrate, slightly rounded above the last ray, much the shortest. Pectorals

small, short and rounded. Ventrals rather nearer the pectorals than to the anal. Anal fin under the dorsal. Caudal deeply emarginate, almost forked; the lobes obtusely pointed.

Color, varies in intensity and tint. In some it is deep green, varying to blackish on the back and head, or bluish grey; in others, it is of a golden or olive-yellow on the sides, the free margins of the scales bordered with black. Numerous irregular abbreviated longitudinal dusky streaks on the sides of the body, united with similar oblique streaks, and producing an imperfectly reticulated appearance. Irides yellowish varied with blue. The fins greenish; those below tinged with reddish.

Length, 12·0 – 36·0.
Fin rays, D. 18; P. 16; V. 10; A. 14; C. 19 $\frac{7}{7}$.

The Common Pickerel is found in most of the ponds and streams throughout the State. They are caught during the whole year, but appear to be most prized in winter. In the districts bordering on the lakes, they are considered inferior to the preceding species.

This species appears to be common through all the Eastern and Middle States, and is found in the waters of the Ohio. It does not extend to the countries north of the great lakes.

I am induced to believe the Black Pike of Saratoga lake, described by Lesueur as *E. niger*, to be the young of this species.

THE VARIED PICKEREL.

ESOX FASCIATUS.

PLATE XXXIV. FIG. 110. – (STATE COLLECTION.)

Characteristics. Greenish yellow, with dusky vertical bars along the sides. Tail slightly emarginate. Length 6 to 10 inches.

Description. Body cylindrical, with its dorsal surface much flattened. Upper part of the head with a deep longitudinal groove. The orifices of mucous ducts disposed irregularly over the head. Teeth smaller than, but similar to, those in the preceding, on the intermaxillaries, lower jaw, vomer, palatines, pharyngeals, base of the tongue, and branchial arches. Dorsal fin higher than long, its margin much rounded. Anal with subequal rays. Pectorals much nearer the end of the snout than the ventrals, which produces a corresponding change in the position of these last mentioned fins.

Color. Dark brownish black above, descending in irregular dark clouds a short distance on the sides. Sides greenish yellow, with irregular vertical brown stripes descending on the belly. Dorsal and caudal fins dark brown. The pectorals, ventral and anal lighter colored; often, by infiltration, reddish. A short dark band from the eye to the angle of the jaw.

Length, 6·0 – 10·0.
Fin rays, D. 15; P. 15; V. 9; A. 14; C. 19 $\frac{5}{5}$.

This beautiful little pickerel is abundant in many of the streams and ponds on Long Island, and is said never to exceed the size given above. Independent of the markings, it appears to be quite distinct from the preceding species. It is not improbable that this may be the species noticed by Dr. Mitchill in his Supplementary Memoir on the Fishes of New-York, under the name of *Esox scomberius*, which is thus alluded to:

"*The Mackerel Pike, &c. Esox scomberius.* An inhabitant of the fresh streams of New-
"York. A figure of this fish was forwarded to me by John Bradbury, Esq. It was exe-
"cuted from the creature, as taken from Murderer's creek. Beside other strong features of
"the Pike, it was distinguished for a large and projecting lower jaw; for the length of the
"head and gill-covers; for the dark green of the back, gradually disappearing in the white
"of the belly, and the two hues connected by cloudy patches almost resembling bands, slant-
"ing forward and downward from the back, by a ruddy tinge of the roundish pectoral, abdo-
"minal and ventral fins; and by a broad concave or lunated tail. Mr. B. states the rays of
"the pectoral fins to be thirteen, of the ventrals nine, of the dorsal fourteen, of the anal thir-
"teen, and of the caudal twenty."

THE FEDERATION PIKE.

ESOX TREDECEM-RADIATUS.

The Federation Pike, E. tredecem-lineatus. MITCHILL, Mirror, 1825, p. 361.

Characteristics. Opercles, pectoral, dorsal, and anal fins each with thirteen rays. Length 12 to 23 inches.

Description. I am unacquainted with this species, except through the description of Dr. Mitchill, which is annexed:

"The figure of the head and mouth bears a considerable resemblance to the Pike or Mas-
"canongy, particularly the broad or duck snout, the projecting lower jaw; and this, together
"with the tongue and palate armed with teeth, and the general shape, are characteristic
"enough. The intermaxillary bone, the situation of the ventral fin far behind on the belly,
"and the opposition of the dorsal fin to the ventral, are additional indications of the same
"family connection. The four individuals now before me were obtained by Mr. William
"Sykes from the Oneida lake, on the 26th January, 1825. The largest is twenty-three
"inches long, and more than nine in its greatest girth. Eyes yellow; tail forked; skin
"covered with small scales. Color of the back, and upper part of the head, brown, almost
"running into black; of the contiguous parts, brown running into yellowish or orange, and
"the yellow ending in a snowy or silvery white on the belly. The broad side, that is, the
"space between the back and belly, beautifully and curiously variegated with irregular black
"lines, which inosculate with each other all the way from the eyes to the tail, and surround
"spaces of various sizes and figures, all of which are fantastic and odd. Toward the belly
"and tail, these black lines lose themselves, or end abruptly. Sometimes there are oblong

" and roundish spots. The modifications of these colors give the fish a very striking, and " indeed elegant appearance ; quite equal to the Spanish mackerel, or indeed superior to it. " Branchiostegous membrane, thirteen rays ; pectoral fin, thirteen ; ventral, nine ; anal, thir- " teen ; dorsal, thirteen ; caudal, about twenty-one. The fins are reddish, and their color " contrasts admirably with the others to increase the beauty of the fish. I know of no fish " of the fresh, or even of the salt water, in the market and region of New-York, that equals " it. The flesh is savory and fine. There is something quite peculiar as to the number of " rays in the fins of this fish, which has led me to the adoption of its specific name. For the " branchiostegous pectoral and dorsal each contain thirteen rays, or with inconsiderable va- " riations in the several individuals, was the most constant number. So it seems to afford " ground for a term indicative of the original States in the Union, by the characteristic num- " ber XIII."

If there be no inaccuracy in the above description, which exhibits the characteristic quaintness of the writer, this must be a distinct species. I have received several pike or pickerel from this lake, which I referred without hesitation to *E. reticulatus*. The " inconsiderable variations" may possibly include the above described species, which, however, demands a farther examination.

(*EXTRA-LIMITAL.*)

E. lucius? (Richardson, F. B. A.) Tip of each scale with a bright speck like the letter V. Scales with four lobes. D. 20; P. 16; A. 18. Length two feet. *Northern Regions.*

E. phaleratus. (Say, Ac. Sc. Vol. 1, p. 416.) A dorsal; reddish brown band, and three or four bands of the same color on the sides. Not described. *East-Florida.*

GENUS BELONE. *Cuvier.*

Head and body greatly elongated; the latter covered with minute scales. Both jaws very much produced, straight, narrow and pointed; armed with numerous small teeth. Pharynx paved. Scales not apparent, except a carinate row near the edge of the abdomen.

THE BANDED GAR-FISH.

BELONE TRUNCATA.

PLATE XXXV. FIG. 112—(STATE COLLECTION.)

Esox, Sea Pike, Sea Snipe at New-York. SCHOEPFF, Beobacht. Vol. 8, p. 108.
The Bill-fish, Esox belone. MITCHILL, Lit. and Philos. Soc. N. Y. Vol. 1, p. 443.
Esox longirostris, Long-jawed Fresh-water Pike. MITCHILL, Am. Month. Mag. Vol. 2, p. 322.
Belona truncata. LESUEUR, Journ. Acad. Nat. Sc. Phil. Vol. 2, p. 126, plate.
The Gar-fish, Belone truncata. STORER, Massachusetts Report, p. 98.

Characteristics. Green above; silvery beneath. A dark green longitudinal band. Lower mandible longest. Length one to two feet.

Description. Body much elongated; covered with small transparent orbicular scales. Over and behind the end of the anal, on each side of the tail, is a row of carinated scales. The lateral line arises from the lower angle of the opercles; ascends gradually beneath the pectorals, maintaining a direction near the abdomen; passes over the base of the ventrals, and behind the anal, rises up and follows the course of the carinated scales. The vertebral line marked above by a slight depression from the dorsal fin to the nape. On each side of this line, at the distance of 0·2, is a faint darker line concurrent with it. Head and opercles trigonal, flat above. Eyes longitudinally oval, 0·6 in their greatest diameter, and with the upper margin of the orbits in the plane of the head; their distance apart equal to the same diameter. A triangular fossa in front of the eyes, extending forward into an acutely pointed furrow for the nostrils. Branchial aperture very ample, extending forward beneath the orbits. Upper mandible flattened at its base, rounded forward, and terminating in an acute tip, its upper margin with a medial and two lateral impressed lines: it is 0·3 shorter than the lower jaw, which is elastic and flexible at its tip. Both mandibles furnished with long conic acute distant teeth, with intermediate smaller ones, externally in confused series; towards the angle of the jaws, the smaller ones are exserted. The interior of the upper jaw with a longitudinal furrow, of the lower, transversely rugous. Length of the mandibles to the whole length as one to five nearly.

The dorsal fin arises far back, commencing over the fourth ray of the anal; it is elevated, triangular in front, low and subequal behind, the second and third rays longest. This fin is composed of one simple and fifteen branched rays. The pectorals on a line with the posterior angle of the opercles, and 0·4 behind it; composed of one flat, simple and scarcely articulated ray, and eleven branched rays. Ventrals feeble; their distance from the origin of the anal,

equal to the distance between the origin of the dorsal and the base of the caudal fin: they contain six rays. The anal similar in shape to the dorsal, and coterminal with it; the first ray short, triangular, subspinous; the second and third longest; after the seventh, the rays are nearly equal: there are nineteen rays. The vent forms a sort of enlarged pouch, with a large oblong aperture. Caudal emarginate; the lower lobe very slightly longest.

Color, from a living specimen captured in September. Upper part of the body a beautiful transparent sea-green, which becomes darker above the opercles and over the nostrils. Opercles and sides of the body bright silvery. Abdomen beneath opaque white. A narrow dark green band arises from the upper part of the angle of the opercle, and running towards the tail, separates the color of the back from that of the sides. Margin of the preopercles deep green. Pupils black; irides silvery.

Length, 22.0; of the head and jaws to the opercular margin, 7.0.
Fin rays, D. 16; P. 12; V. 6; A. 19; C. 19 $\frac{3}{3}$.

I have adopted the name proposed by Lesueur, as I have very little doubt but that he had the same species in view, although his notice is very imperfect, and his trivial name unmeaning. I have examined many specimens, and have found in none the tail so unequal as his figure would seem to indicate; it was probably a deformed or mutilated specimen.

I am disposed to believe the *E. longirostris* of Mitchill to have been intended also for this species, but his description is too imperfect to render this certain. He observes, "It is said to grow to the length of three or four feet, and is always an inhabitant of fresh water."

The Gar-fish occurs on our coast chiefly in the latter part of summer and in the autumn, from which I infer that it is a southern fish. I do not find it, however, among Dr. Holbrook's drawings, nor among Parra's figures. Its farthest northern range hitherto observed has been on the coast of Massachusetts, south of Cape Cod. It is highly prized by epicures.

GENUS SCOMBERESOX. *Cuvier.*

Snout greatly attenuated and elongated as in the preceding. Teeth in both jaws; more on the palatines and tongue. Dorsal and anal fins divided behind into numerous finlets.

THE BILL-FISH.

SCOMBERESOX STORERI.

PLATE XXXV. FIG. 111.

Scomberesox equirostrum et *scutellatum*. LESUEUR, Journ. Acad. Nat. Sc. Vol. 2, p. 132.
S. id., The Bill-fish. STORER, Massachusetts Report, p. 100.

Characteristics. Dark green above. Lower jaw longest. Body with a broad silvery band. Length ten to twelve inches.

Description. Anguilliform; nearly of equal depth and width to the origin of the dorsal fin. Scales small. Lateral line straight, indented, concurrent with, and near to the dorsal outline. On each side of the abdomen is a longitudinal furrow, which begins at the underside of the opercles, and extends to the base of the caudal fin; dilated near the ventrals. Head deep, long and narrow compared with the body. Eyes small, 0·2 in diameter. Jaws elongated, and furnished at the base with very minute teeth; the upper jaw an inch and a half long; the lower jaw about a quarter of an inch longer. Opercles large, smooth and silvery. The dorsal fin longer than high, and composed of ten nearly subequal rays. Behind it are five pinnulæ or finlets. Pectorals pointed, of fourteen rays, with the first ray longer and broader than the others. Ventral fins just in advance of the anal. Caudal broadly excavated.

Color. Body above dark green. Head above deep green. Beneath the green of the back, a broad silvery band extends through the whole length of the body, and divided in the centre by a narrow green line. Gill-covers and abdomen silvery. Dorsal and its finlets greenish tinged with yellow. Pectorals dark at the base; the rays silvery. Ventrals and anal white; the finlets of the latter yellowish.

Length, 10·0; of head and jaws, 3·0.
Fin rays, D. 10.v.; P. 14; V. 6; A. 12.v.; C. 20.

The original notice of this species by Lesueur, was made from an imperfect and dried cabinet specimen; and his name, of very dubious latinity, and drawn from a false character, must be rejected. The name which I have attached to it, is due to the distinguished Ichthyologist who pointed out distinctly the impropriety of the appellation, and was its first accurate describer.

A specimen of this fish, to which Lesueur has attached another name, was obtained from the banks of Newfoundland. On the coast of Massachusetts, they appear in immense num-

bers in October, where they are considered as a very nutritious and grateful food. A few stragglers are occasionally taken on the coast of New-York, which is presumed to be the extreme limits of its southern range.

GENUS EXOCETUS. *Linneus, Cuvier.*

Pectorals nearly as long or longer than the body, and sufficiently developed to enable them to suspend themselves in the air. Head and body scaly. Jaws with pointed, and pharyngeals with paved teeth. In some species a row of carinate scales on each side of the abdomen. Air-bladder very large.

THE NEW-YORK FLYING-FISH.

EXOCETUS NOVEBORACENCIS.

PLATE XXXVI. FIG. 114.

The New-York Flying-fish, E. noveboracensis. Lit. and Phil. Soc. pl. 5, fig. 3; Am. Month. Mag. Vol. 2, p. 323.

Characteristics. Dark green above. Abdomen carinate on the sides. Teeth very minute. No filaments to the lower jaw. Length 12 inches.

Description. Head smooth, trigonal. Scales thick and deciduous. A row of carinated scales on each side of the abdomen, from the lower edge of the gill-covers to the tail. Eyes large, with a moderate depression between them, and three small pores on each side, and small channelled lines along the back. Dorsal fin with its commencement over the ventrals, and containing fourteen rays. Pectorals five and a half inches long, with fifteen branched rays. Ventrals three inches long, and with six rays. Anal longer than high, with eight short subequal rays. Caudal deeply lunate, with its lower lobe much longer. Branchial rays ten.

Color. Above, dark greenish; beneath white. Irides silvery yellow.

Length, 12·0. Depth, 1·5.
Fin rays, D. 14; P. 15; V. 6; A. 8.

The number of rays in the dorsal and anal fins of this fish must separate it from *exiliens*, to which it has been referred. The specimen which furnished Dr. Mitchill with the above description, was taken in a seine near New-York. Although natives of the tropical seas, they have been known to ascend along the European shores of the Atlantic as high as 50° north latitude.

THE SINGLE-BEARDED FLYING-FISH.

EXOCETUS COMATUS.

PLATE XXXVI. FIG. 115.

E. comatus, The Single-bearded Flying-fish. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 448, pl. 5, fig. 1.
E. appendiculatus. WOOD, Journal Acad. Nat. Sciences, Vol. 4, p. 283, pl. 17, fig. 2.

Characteristics. A long black cirrus depending from the chin, with occasionally a shorter one on each side. Length five to six inches.

Description. Head trihedral, depressed above, declivous. Body covered with robust deciduous scales. Snout somewhat obtuse; lateral line straight; mouth small; a blackish cirrus 2·5 long, depending from the chin. Dorsal with its anterior portion slightly elevated; tips of the pectorals extend to the end of the dorsal fin. Ventrals under the dorsal, and extend towards the end of the anal. Caudal furcate; upper lobe shortest.

Color. Above brown; beneath white.

Length, 5·0.
Fin rays, D. 11 or 12; P. 13; V. 6; A. 7; C. 19.

On the authority of Cuvier, I have united the species above cited.

THE DOUBLE-BEARDED FLYING-FISH.

EXOCETUS FURCATUS.

Double-bearded Flying-fish, E. furcatus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 449, pl. 5, fig. 2.
E. nuttallii? LESUEUR, Ac. Sciences, Vol. 2, p. 10, pl. 4, fig. 1 (young).

Characteristics. Abdomen with a series of carinated scales. Two cirri, or laciniated appendages, to the lower jaw. Length three inches.

Description. Eyes large. Ventral fins very long, and placed about two-thirds of the distance between the pectorals and the vent. Dorsal and anal large and truncated. Scales small, adherent.

Color. Bluish above; silvery on the sides. Pectorals and ventrals with brown bands.

Length, 3·0.
Fin rays, D. 15; V. 10; A. 8; C. 17.

The descriptions of both the above cited authors are very incomplete, but I believe there can be little doubt of the identity of the species. The *mesogaster*, cited by Mitchill, is very doubtful, and certainly has not been found on our northern coast as far as I am acquainted. The *fasciatus* of Lesueur (*Ac. Sc.* Vol. 4, p. 9), observed near the Gulf of Mexico, I am disposed to refer to the *exiliens* of Bloch. The bearded flying-fish have been very properly united into a distinct group, under the name of *Cyprilurus*, by some recent writers.

FAMILY FISTULARIDÆ.

Mouth elongated into a tube, formed by the extension of the ethmoid, vomer, preopercles, interopercles, pterygoidal and tympanal bones. At the extremity is the mouth, composed as usual of the intermaxillaries, palatines and mandibulary bones. Ribs short or wanting. Some of the genera are long and cylindrical; others short and compressed.

Obs. By some writers this has been made a sub-family of the *Scomberidæ*, and it does not appear among the Spine-rayed fishes in the great work of Messrs. Cuvier and Valenciennes. Its true place is probably near or among the *Syngnathidæ*. I am acquainted with but two representatives of this family on our coast.

GENUS FISTULARIA. *Lacépède, Cuvier.*

Body elongated, cylindrical. Dorsal above the anal. Intermaxillaries and lower jaw armed with small teeth. A long filament arises from between the two lobes of the tail. Tube of the mouth depressed. Air-bladder very small. Scales invisible.

THE AMERICAN PIPE-FISH.

FISTULARIA SERRATA.

PLATE XXXV. FIG. 113.

The Tobacco-pipe Fish, F. serrata. STORER, Fishes of Massachusetts, p. 80. (Adult.)

Characteristics. Reddish brown above, with a narrow bluish band along the sides. Tube strongly serrated on its sides. Length exclusive of the caudal filament, nineteen inches.

Description. Body cylindrical, elongate, with numerous asperities visible under the lens, and slightly rough to the touch. The lateral line commences just above the posterior portion of the opercle, runs obliquely backwards about an inch, then rises and approaches within 0·2 of the line on the other side, continuing in this direction in a straight line for about 1·5; it then passes down suddenly to the middle of the body, and runs a straight course through the middle of the lateral band. Near its origin, it is rather indistinct; but on the posterior half of the body, it becomes covered with a series of elevated carinated plates. Entire length of the head, from the end of the snout to the margin of the opercle, 6·8. Tube wider than deep, of a hard horny consistence, strongly serrated along each side with short spines directed forwards, and extending to the anterior portion of the orbits. This tube, just in front of the eyes, is 0·75 wide; and at the angle of the jaws, 0·5. Vertical gape of the mouth, 0·5. Nostrils single, oval, and 0·3 in advance of the orbits. Lower jaw longest, with a protube-

rance at the chin. Both jaws armed with numerous small acute and recurved teeth. Gill-covers radiated, with a flat trifid spinous elevation on the upper and anterior part of their surface. Over the opercle, a strong bony serrated or rather spinous ridge, 0·7 in extent. Orbits elliptical, 0·5 long, and 0·35 apart. There are prominent angular serrated processes on the anterior and posterior portions of the upper margin of the orbits. Head above with longitudinal furrows on its surface.

The dorsal fin small, pointed, triangular, and placed on the posterior third of the body. Pectorals broad, subtruncate, and placed 0·25 posterior to the opercle; their length to their width as one to three. Ventrals 2·5 behind the pectorals; very small, distant, and 0·4 long. Anal similar in shape and size to the dorsal, against which it is placed. Caudal deeply forked from between its lobes arises, as if a continuation of the lateral line, a strong filament, elastic as baleen. This filament is nine inches long, jointed at the base, and delicate towards the tip; at its base arises a short filament, and at the distance of 6·0 from the base, another very short bifid filament.

Color. Upper part of the body reddish brown. A narrow bluish longitudinal band along the sides, through the centre of which passes the lateral line. Abdomen light-colored. Dorsal and ventrals white.

Length, 19·0; of the caudal filament, 9·0.
Fin rays, D. 14; P. 16; V. 6; A. 14; C. 16 $\frac{3}{3}$.

The species of this genus are still involved in great obscurity. Cuvier, in his *Règne Animal*, cites three species. Cloquet, in the *Dictionnaire des Sciences Naturelles*, asserts that only one is known. We are to await the publication of the work of Cuvier and Valenciennes before this point will be definitively settled. There certainly appears to be two species on our coast; the one just described, and another very briefly indicated by Dr. Mitchill. I have to return my thanks to Dr. Storer, for his kindness in favoring me with an opportunity of examining and figuring the specimen which furnished him with his description.

THE SPOTTED PIPE-FISH.

FISTULARIA TABACARIA.

The New-York Trumpet-fish, F. neo-eboracensis. MITCHELL, Lit. and Phil. Soc. Vol. 1, p. 437, pl. 3, fig. 8.

Characteristics. A row of pale spots on the sides. Orbits of the eyes with angular processes or spines.

Description. Body rounded, slender; its depth less than its thickness. Tube 2·5 long grooved or fluted on the sides. The lower jaw projecting beyond the upper. Gill-opening ample; opercle radiated. Orbits large, contiguous, and beset with angular processes (in the figure representing spines). Lateral line as in the preceding. Surface smooth and scaleless. Ventrals small, and far apart. Dorsal and anal opposite. Caudal filament 4·0 long.

Color. Brown on the back, with a row of pale spots. Belly white in the middle, and semi-diaphanous on the right and left. Eyes orange-colored.

Length, 14·0.

This is a very indistinct notice by Dr. Mitchill, but there are sufficient indications that it is a distinct species. Some years since, I obtained in the harbor of Pernambuco (Brazil), a Fistularia, which I suppose to be identical with that above indicated. I annex the notes which I made at the time:

"*Fistularia tabacaria?* Color brownish, with round whitish spots more conspicuous in front. Throat white.

"*Dimensions*. Tube, from the mouth to the margin of the opercle, four inches. Body, from the gills to the fork of the caudal, seven inches and a half. Caudal thread three inches. Diameter of orbits half an inch; depth of head the same. Distance of the dorsals from above the pectorals, four and a half inches. Total length fifteen inches.

"Tube serrated on the lateral ridges of each side. The ridges on the vertical surface smooth; those beneath minutely serrated. Lower jaw longest; both with minute distant recurved teeth: a strong protuberance on the symphysis. Nostrils three-tenths before the eyes. Eyes longitudinally oval, silvery; the antero-superior margins raised, with a furrow between; the superior posterior margin serrated; and from this margin proceeds posteriorly a strong serrated ridge over the opercle, which is oblong, smooth, slightly radiate on its posterior margin. Pectorals two-tenths behind the opercle, truncated at tips. Dorsal triangular, resembling the anal, and beneath it. Lateral line rises apparently from immediately behind the orbits, where it forms a simple ridge, and nearly unites with that of the opposite side; then descends just anterior to the ventrals, forming a row of interrupted tubes, and, towards the tail, a raised line. Ventrals small, distant one and a half inches behind the base of the pectorals. Caudal fin (if it be not a second dorsal and anal?) forked, with a slender appendage like whalebone, and terminating in a fine thread. D. 16; P. 16; V. 6; A. 16; C. 16 $\frac{3}{3}$.

"*May* 18, 1827."

I am induced to believe that this is the true *tabacaria* of authors, characterized by rounded white spots on the sides and spinous orbits; and of course, Mitchill's specimen, which appears to have been quite fresh, must be referred to this species. Its geographic range is therefore from Brazil to the coast of New-York, and probably even still farther north; for Smith, in his History of Massachusetts, speaks of having seen two specimens of this fish from the coast of Martha's Vineyard, in 41° 30′ north latitude. The specimens were eighteen inches long, exclusive of the caudal filament, which was one foot long.

FAMILY SALMONIDÆ.

Body more or less scaly. Two dorsals; the first with articulated rays, the second adipose. Numerous cæcal appendages, and an air-bladder. Excessively voracious. Great variation in the armature of the jaws. Inhabiting fresh and salt water.

GENUS SALMO.

Branchial membrane with more than eight rays. Anal fin with less than thirteen rays.

THE BROOK TROUT.

SALMO FONTINALIS.

PLATE XXXVIII. FIG. 120.

S. fontinalis, New-York Trout. MITCHILL, Report in part, &c. p. 52.
S. id., Common Trout. ID. Trans. Lit. and Phil. Soc. Vol. 1, p. 345.
Red Spotted Trout. DOUGHTY, Cabinet Nat. Hist. Vol. 1, p. 145, pl. 13.
New-York Char. RICHARDSON, F. B. A. Vol. 3, p. 176, pl. 83, fig. 1, and pl. 87, fig. 2.
S. fontinalis. STORER, Report on the Fishes of Massachusetts, p. 106.

Characteristics. With vermilion dots, and larger yellow spots in the vicinity of the lateral line. Gill-covers with no defined spots. Length 6 – 20 inches.

Description. Body oblong, compressed; back broad and rounded. Head sloping nearly symmetrically from above and beneath; equal to one-fifth of the total length, or equal to the interval between the ventrals and anal. Scales minute, oblong, imbedded in the skin. Lateral line slightly curved downward. Nostrils equidistant between the eyes and snout, with a double opening; the posterior closed by a valve. Branchial rays twelve. Labial armed with numerous acute incurved teeth, nearly to the extremities; somewhat shorter on the intermaxillaries. Tongue with from four to six teeth on each side. About twelve recurved teeth on each side of the palatines, and from six to eight on the vomer.

The first dorsal fin equidistant between the pectoral and the adipose fin; quadrate, with its base equal in length to the fourth or fifth ray; the first ray very short, and the two following gradually longer; from the fifth, the rays gradually diminish in length to the last; the first three rays simple. Adipose dorsal somewhat pointed behind, and nearly equal in length to the diameter of the eye; it is placed above the last four rays of the anal. Caudal deeply emarginate. The intestines scarcely exceed the body in length. Stomach stout and muscular, filled with remains of earth-worms, water beetles, etc.; cæca numerous. Air-bladder occupying the whole length of the abdomen, simple, cylindrical, slightly tapering behind.

Color. Body above with irregular dark markings on a horn-colored ground, which, in freshly taken specimens, gives bluish metallic reflections. Sides bluish, mixed with silvery white; the whole underside silvery. Upper part of the head dark greenish brown, with obscure

mottlings. First dorsal pale yellowish, with horizontal interrupted bars of dark green. Pectorals pointed; the first ray light yellow; the second blackish, and the remainder orange. Ventrals and anal with their first rays entirely white, as are the tips of the second and third rays. The bodies of the second and third, and the tip of the fourth, black, which causes them to appear blackish on their edges, and broadly bordered with white; the remaining rays reddish. Caudal reddish, with obscure parallel dark bands, which are more distinct towards the tips of the lobes. Irides white.

Length, 8·0. Depth, 1·3.
Fin rays, D. 13.0; P. 12; V. 8; A. 10; C. 19 $\frac{6}{6}$.

The specimen from which the above description was taken, was a female. It is about the average size of the smaller kind of brook trout. I have never seen any exceeding fourteen inches in length, but I am credibly informed of one taken on Long island, which measured twenty inches in length, and weighed four and a half pounds. Those from running streams are better flavored than the pond trout; and those taken from streams to which the salt water has access, are preferred to either. The latter have brighter colors externally, and their flesh has more of the salmon color.

The Brook Trout is a northern species, being found in almost all the clear running streams and ponds throughout this and the northern States. I am unable to state with precision its southerly range. It occurs in the head waters of the Delaware, Susquehannah and Allegany rivers, but never descends into the Ohio. According to Dr. Kirtland, it is found only in two small streams in the State of Ohio, viz. a small creek in Ashtabula county, and a branch of Chagrin river, Geauga county, bordering upon Lake Erie. I have no information of its being found north of the forty-seventh or south of the fortieth parallel of latitude.

THE RED-BELLIED TROUT.

PLATE XXXIX. FIG. 136.

SALMO ERYTHROGASTER.

Creek Trout? DOUGHTY, Cabinet of Nat. Hist. Vol. 1, p. 134, pl. 13, fig. 2.

Characteristics. Above, mottled with dark olive-green and light horn-color. Sides of the abdomen reddish orange, separated by a distinct line from the pearl color beneath. Tail broadly margined with bright red. Length 15 to 20 inches.

Description. Body symmetrical, tapering. Scales very small and rounded. Lateral line concave anterior to the dorsal; the remaining part straight. Tongue with five incurved teeth on each side; the snout with a deep notch, to receive the prominent conical knob on the lower jaw. Five curved subequal teeth on the intermaxillaries; labials with fifteen; lower jaw with sixteen on each side, and about eight on the vomer. The dorsal quadrate, slightly higher than long, its origin being an inch nearer the snout than to the tip of the caudal fin. It is

1·7 high, and is composed of ten rays; the adipose slightly falcate, rounded, 0·7 high. Pectorals two inches long, and arise anterior to the opercular margin. Ventrals broad and pointed, arising under the fourth ray of the dorsal fin, and composed of eight rays. Anal higher than long, its longest ray being 1·8 in length; base of the fin 1·1, slightly emarginate. Caudal concave, composed of seventeen complete and with numerous accessory rays; its diameter across the tip 2·5.

Color. Above, dark olive-green, with confluent blotches of a lighter color on each side of the back, resembling those on the common mackerel. Head above, uniform olive-green. Sides bronze-brown, with numerous rounded rich salmon-colored spots, becoming larger toward the tail; these are intermixed with smaller crimson dots. The belly of a brilliant reddish orange, separated by a distinct line from the pearl color beneath. Membrane of the gill-rays, and interior of the mouth, with a black pigment. The first rays of all the fins, except the dorsal and caudal, opaque white, edged with black; the other rays of a brilliant flesh-red; inside of the pectorals black. Dorsal varied with dark green and opaque or horn color. Ventral with its black margin extending over two or three of the adjacent rays. Caudal broadly margined with bright red. Flesh incarnate red.

Length, 15·5; of the head 3·3. Depth, 3·0. Weight one and a half pounds.
Fin rays, D. 10.0; P. 14; V. 8; A. 10; C. 17 $\frac{5}{5}$.

This beautiful species, which has probably been confounded with the preceding, I first noticed at Indian lake, Hamilton county; then at the outlet of Lake Janet, one of the Eckford chain, emptying into Lake Raquet; and subsequently in most of the streams in Hamilton, St. Lawrence, Franklin and Essex counties. There is a beautiful variety of this species in Silver lake, Pennsylvania, with head and opercles unusually dark. They sometimes attain the weight of four and even five pounds. Independent of other considerations, as will be apparent from the description, the regularity and brilliancy of their colors seem to render it proper to designate them by a distinct specific name.

Between this species and the Lake Salmon, next to be described, there is a continued warfare; and hence it is never found except at the outlets of lakes, and in streams. It chiefly affects the rapids above waterfalls, and the deep pools below them. It rises to the fly, but will readily take the common earth-worm. One of the best baits I found to be the ventral fins of this fish, which, as it moves rapidly through the water, resembles a gaudy butterfly. In taking this species, the trained sportsman will often find his snoods snapped, his jointed rod broken in pieces, and his reel rendered useless; while a simple native by his side, with a coarse line five or six feet long, tied to a short stick, will jerk them out as rapidly as his clumsy hook (fabricated at the nearest blacksmith's shop) touches the water.

Various causes have been assigned for the great variety in the color of the flesh of this and other congeneric species. One cause is said to be the difference of food: such as live upon fresh-water shrimps and other small crustacea, being brightest; those which feed upon common aquatic insects, being next; and those living upon aquatic vegetables, being dull and darkest of all. It is very doubtful, however, whether any trout feeds on vegetables, the

armature of their mouth very clearly pointing out the nature of their food. All that we know positively on the subject, is that in our brook trout, those which inhabit ponds are dark colored externally; those in clear streams running over sandy bottoms, are bright; and those which are found in salt or brackish streams, are not only very bright externally, but their flesh has more of the salmon color. In the present species, which is only found in fresh-water streams, not only the colors externally are extremely vivid, but the flesh is of a bright red approaching carmine.

They are above the average size of the preceding. Out of many taken at different times, I should be disposed to say that the average weight was about a pound and a half. I do not remember to have seen one weighing four pounds, although I have heard of their weighing more.

THE LAKE TROUT.

SALMO CONFINIS.

PLATE XXXVIII. FIG. 123.

The Lake Trout. DOUGHTY, Cabinet of Natnral History, Vol. 1, p. 145, pl. 13, fig. 1.

Characteristics. Blackish, with numerous grey spots. Body robust; comparatively short in proportion to its depth. Caudal fin with a sinuous margin. Length two to four feet.

Description. Body stout, thicker and shorter than the common salmon. Length of the head to the total length, as one to four and a half nearly. Dorsal outline curved. Scales small, orbicular and minutely striate. The lateral line distinctly marked by a series of tubular plates, arising at the upper angle of the opercular opening, slightly concave until it passes over the base of the pectoral fin, when it proceeds straight to the tail. Head flattened between the eyes. Snout produced, and, in aged individuals, with a tubercular enlargement on its extremity. Eyes large; the antero-posterior diameter of the orbits 1·5, and their distance apart 2·5. Nostrils contiguous, patent; the anterior vertically oval, the posterior smaller and rounded. Under jaw shortest, and received into a cavity in the upper. The transverse membrane over the roof of the mouth exceedingly tough and thick; the numerous curved teeth in the jaws partly concealed by a loose fleshy membrane. Tongue long, narrow and thick, with series of large teeth along the central furrow. Many series of acute teeth on the vomer and palatines.

The first dorsal fin with its upper margin rounded, subtriangular, arising somewhat nearer the snout than to the extremity of the caudal rays, higher than long; measuring 4·5 in height, and 4·0 along the base. It is composed of fourteen rays; the first two short, and imbedded in the flesh; the fourth and fifth rays longest. The adipose fin 1·0 long, rounded at the end, scarcely narrowed at the base, an inch long, and placed over the end of the anal fin. Pectoral fins broad and pointed, five inches long, and arising slightly behind a line drawn from the upper posterior angle of the opercle; it is composed of fourteen rays. The ventral fins placed nearly under the centre of the dorsal fin, composed of nine rays, and furnished with a thick

pointed axillary plate. Anal fin quadrate; its extreme height 4·4, and its base 3·0; composed of twelve robust rays. Caudal fin nine inches in extent from tip to tip, furcate, with a sinuous margin.

Color, from a living specimen. All the upper portion of the head and body bluish black. Sides of the head and body, base of the first dorsal, of the caudal and anal fins, with numerous rounded crowded irregular light grey spots. On the base of the dorsal and caudal, the spots are oblong, light greenish. Chin brownish bronze. Pupils black; irides salmon-colored. Tips of the lower fins slightly tinged with red.

Length, 31·3; of the head, 7·3. Weight 15 pounds.
Fin rays, D. 14.0; P. 14; V. 9; A. 12; C. 21 $\frac{3}{3}$.

This is the well known *Lake Salmon*, *Lake Trout* or *Salmon Trout* of the State of New-York. Among the thirteen species or varieties of Lake Trout or Lake Salmon, so beautifully illustrated by Richardson, I cannot find this species described. It appears most nearly allied by the figure to *S. hoodii* (Pl. 82, 83 and 87), but differs in very important particulars from that species. It occurs in most of the northern lakes of this State, and I have noticed it in Silver lake, Pennsylvania, adjacent to Broome county, which, as far as I know, is its southernmost limits. I have to acknowledge my obligations to Miss Ann Rose (now Mrs. Main), for a beautiful drawing of the Lake Salmon from this locality. The figure illustrating this species was from a specimen taken at Lake Louis, Hamilton county, and was selected for his unusual size and vigor. The average weight is from eight to ten pounds, but I have heard fishermen speak of some weighing thirty pounds and even more. There is, however, such a strong propensity to exaggeration in every thing pertaining to aquatic animals, that I refrain from citing cases derived from such sources.

The Lake Trout furnishes an important, and often necessary article of food, to the frontier settler. They frequent the deepest part of the lake, and unlike most of their congeners, never rise to the fly. In order to take them, particular deep spots are selected and marked by buoys. Large quantities of small fish are then cut up and thrown in at the buoys for several days in succession. After having been thus baited, and accustomed to resort to the spot, they are then readily taken by the hook. Some idea of their abundance may be formed from the fact that a single fisherman has been known to capture, on Paskungameh or Long lake, five hundred weight in the course of a week. Its price, when salted down, is ten cents per pound; but in winter when it can be preserved fresh, it sells from twelve to fourteen cents the pound. It has become, in these regions, an important article of commerce; and if the settlers would confine themselves to bait fishing, the species would be long preserved. Unfortunately, however, they are speared in great numbers in October, when they are said to come out in the shoal water to spawn. Any legislative enactment for their preservation, however, would be useless in these thinly peopled districts; and, of course, we may look for the gradual but certain extirpation of this species.

The flesh is of course esteemed in these districts, where no oceanic fish is ever tasted; but to me, it appears to possess all the coarseness of the halibut, without its flavor.

THE MACKINAW SALMON.

SALMO AMETHYSTUS.

PLATE LXXVI. FIG. 241.

The Namaycush Salmon. PENNANT, Arctic Zoology. Supplement, p. 139.
The Great Trout of the Lakes, Salmo amethystus. MITCHILL, Jour. Acad. Sc. Vol. 1, p. 410.
The Namaycush, S. namaycush. RICHARDSON, Faun. Boreal. Am. Vol. 3, p. 179, pl. 79 and 85.
The Mackinaw Trout, S. namaycush. KIRTLAND, Report on the Zoology of Ohio, p. 195.

Characteristics. Dark grey, with numerous light grey spots on the back and sides. Teeth and gums tinged with purple. More elongated than the preceding. Length two to five feet.

Description. Body robust. Scales small, oval and adherent. Lateral line nearly straight, arising from a short distance below the upper angle of the branchial aperture. Dorsal outline moderately arched. Head one-fourth of the total length, somewhat plane above, and without scales. Eyes moderate. Nostrils double, contiguous; the anterior with a slightly elevated margin. Mouth large. Jaws very strong and massy; in the male, the upper is longest, and the lower has a conical knob at its tip. Teeth on the edges of the intermaxillaries, in a single series; along the labials, in two series, of which the outer is smaller and more numerous. On the vomer and palatines, a double row; the lower jaw and tongue with a single row on each side. All these teeth are strong, sharp and recurved, deeply imbedded in the jaws in the gums, and of a beautiful purplish color at their bases, resembling that of amethystine quartz; their tips are translucent. Branchial rays twelve; subopercle large and grooved. Air-bladder communicates with the œsophagus by a large tube.

The dorsal fin nearly in the centre of the fish, its height slightly longer than its base, quadrate; the first two rays short, the fourth longest. Adipose short and small, over the last ray of the anal. Pectorals placed low down, pointed, and of fifteen rays. Ventrals with nine rays; the first ray stout, and with a pointed accessory scale. Anal with thirteen rays, of which the first is much shorter than the second. Caudal forked.

Color. Dark or dusky grey above; chin, throat and belly, light ash-grey or cream-color; the back and sides sprinkled with numerous irregular lighter grey or brown, or soiled white spots, which do not, however, as in the preceding species, rise upon the fins. Ventrals, anal and pectorals slightly yellowish. Irides yellow. The teeth, gums and roof of the mouth with a bright purple tinge already described.

Length, 24·0 – 60·0.
Fin rays, D. 14.0; P. 15; V. 9; A. 11; C. 19 $\frac{6}{6}$.

It was doubtless through inadvertence that Richardson selected the indian name applied to it by Pennant, in preference to the first trivial name proposed for this species by Dr. Mitchill.

This magnificent Trout, which is the largest hitherto known of the *Salmonidæ*, exists in all the great lakes lying between the United States and the Arctic ocean, is exceedingly voracious, feeding upon every fish within its reach; and according to Dr. Mitchill, is sometimes of the weight of one hundred and twenty pounds. It is a favorite article of food with the Canadian voyageurs, who frequently eat it raw. Its flesh is reddish. Like the preceding species, it resorts habitually to the deepest parts of the lake, and only comes near the shores in October to spawn, when the natives spear it by torch light. Lake Huron appears to be its most southerly range in any considerable numbers, although a few are taken occasionally in Lake Erie, along the shores of Ohio, Pennsylvania and New-York.

It has been observed as far north as the sixty-eighth parallel.

THE COMMON SEA SALMON.

SALMO SALAR.

PLATE XXXVIII. FIG. 122.

Salmo salar. LINNEUS, 12 ed. p. 509; MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 435.
S. id. DE WITT CLINTON, Lit. and Phil. Soc. N. Y. Vol. 1, p. 147.
S. id., The Salmon. STORER, Mass. Report, p. 104; RICHARDSON, F. B. A. Vol. 3, p. 145.

Characteristics. Elongated. Bluish black above; paler grey beneath. Pectorals, dorsal and caudal blackish. Length 2 to 3 feet.

Description. Body elongate oval; the greatest depth in front of the dorsal fin. Head one-fifth of the total length. Scales on the body moderate, thin, oval, rather easily detached; with about one hundred and twenty along the lateral line, and about forty-five in an oblique series. Lateral line straight and nearly central. Head naked, declivous. Nostrils contiguous, vertical, and much nearer the eyes than the extremity of the snout. Teeth numerous, robust, sharp and incurved, in a single row on the under jaw; one or two on the anterior part of the vomer; three to five on the tongue. Dorsal fin emarginate above, and half way between the point of the upper jaw and the base of the caudal fin; the adipose fin long and rounded. Pectorals pointed, equaling in length the base of the first dorsal. Ventral with its first ray simple, and a pointed accessory plate. Anal quadrate, higher than long. Caudal lunated, with a sinuous margin. Branchial rays twelve.

Color. Above to the lateral line, bluish black tinged with grey; beneath this, silvery white. Head darker than the upper part of the body. Ventrals and anals light-colored; the former dark on the membrane connecting the first three rays. Abdomen pearly white, intermixed with bluish tints. Opercle with one or more dark spots, which are occasionally found distributed over the body.

Length, 24·0 – 36·0.
Fin rays, D. 1.30; P. 15; V. 9; A. 9; C. 19 $\frac{6}{5}$.

The Sea Salmon rarely now appears on our coast, except as a straggling visiter. Such an occurrence took place in August, 1840, when a salmon, weighing eight pounds, entered the Hudson river, and ascended it more than one hundred and fifty miles, when it was taken near Troy. Previous to the setting of so many nets along the whole course of this river, it is probable that salmon were more numerous. In the Journal of Hendrick Hudson, when he first describes the noble river which now bears his name, he states, "Many salmon, mullets and rays very great;" and when he passed the Highlands, he says, "Great stores of salmon in the river." It now is only seen on our northern borders, ascending the St. Lawrence from the sea, and appearing in Lake Ontario in April, and leaving it again in October or November. They were formerly very abundant in the lakes in the interior of the State, which communicated with Lake Ontario; but the artificial impediments thrown in their way have greatly decreased their numbers, and in many cases caused their total destruction. I have seen some from Oneida lake weighing ten and fifteen pounds, and one of them exhibited the following radial formula:

Fin rays, D. 12.0; P. 14; V. 9; A. 9; C. 19 $\frac{5}{5}$.

They are occasionally found in Lake Ontario during the whole year; but as the same instinct which compels them to ascend rivers, also leads them again to the sea, and as there is no barrier opposed to their return, we may presume that these are sickly or possibly barren individuals.

The geographical range of the Sea Salmon, along the Atlantic coast of America, extends from New-York to Labrador.

(*EXTRA-LIMITAL.*)

S. scouleri. (Richardson, Vol. 3, p. 158, pl. 93.) Back anterior to the dorsal fin, gibbous. Jaws elongated; the upper jaw much incurved and arched. Length two feet. *N. W. Coast.*

S. rossii. (Id. p. 163, pl. 80.) Long cylindrical. Red beneath; brownish above, with a few crimson dots along the course of the lateral line. Length 2 – 3 feet. *Arctic Seas.*

S. hearnii. (Id. p. 167.) Olive green above. Belly bluish; several rows of large red spots on the sides. Length 12 inches. *Coppermine River.*

S. alipes. (Id. p. 169, pl. 81.) Slender. Greyish, with lighter spots. Scales small. Teeth only on anterior part of the vomer. Fins remarkably long. Length two feet. *Arctic Regions.*

S. nitidus. (Id. p. 171, pl. 82.) Deep green above; orange red beneath, with small red spots in two or three series along the course of the lateral line. Length 20 inches. *Arctic Regions.*

S. hoodii. (Id. p. 173, pl. 83.) Olive green above, and covered with numerous yellowish grey spots. Form slender cylindrical. Length two feet. *Northern Regions.*

S. mackenzii. (Id. p. 183, pl. 84.) Head long, compressed, flattened above. Greyish, tinged with blue on the sides and beneath. Length 20 inches. *Arctic Sea.*

S. quinnat. (Id. p. 219.) Bluish grey; dark spots along the lateral line; belly white, unspotted. Branchial rays seventeen. Length 2 – 3 feet. *Columbia River.*

S. gairdneri. (Id. p. 221.) Dorsal line nearly straight, unspotted. Ash grey on the sides; belly white. Length 2 – 3 feet. *Columbia River.*

S. canadensis. (Grif. Cuv. Vol. 10, p. 474, pl. 41.) White circular spots along the sides, with a red central dot. Pectoral, anal and caudal barred with black. Length ten inches. *St. Lawrence.*

GENUS OSMERUS. *Cuvier.*

Branchial membrane with only eight rays. Teeth on the jaws and tongue, very long and sharp; two distinct rows on each palatine bone. Anal fin with more than fourteen rows.

THE AMERICAN SMELT.

OSMERUS VIRIDESCENS.

PLATE XXXIX. FIG. 124.

Smelt, Salmo eperlanus. MITCHILL, Report in part, p. 12.
Salmo id., Smelt. ID. Trans. Lit. and Phil. Soc. N. Y. Vol. 1, p. 435.
Osmerus viridescens. LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 230.
The Smelt, O. viridescens. STORER, Mass. Report, p. 108.

Characteristics. Greenish above; silvery beneath, with a longitudinal band. Stomach with a few short cæca. Length 6 – 12 inches.

Description. Body elongated, cylindrical, tapering gradually towards the head and tail. Scales large, oval, concentrically striate. Lateral line straight, not concurrent with the line of the back. Head rather more than one-fifth of the total length, sloping, smooth. Nostrils large, double, contiguous, nearly equidistant between the eyes and end of the snout. Distance from the tip of the snout to the posterior margin of the opercle 2.5. Eyes large. Lower jaw longer than the upper, armed with strong, acute, recurved teeth; labial finely serrated. Tongue with two or three long teeth on each side, with a larger one in front near the tip; palatines with a row of smaller teeth. The vomer with asperities in front.

The first dorsal commences at a point midway between the base of the caudal fin and the tip of the snout; its height equal to twice the length of its base; the two first rays simple, the first very short, the second longest, thence very gradually diminishing to the last. The adipose dorsal long and narrow, nearer the base of the caudal than to the last rays of the first dorsal, and over the posterior third of the anal. Pectorals pointed and fan-shaped; its first ray simple, short and dark-colored. Ventrals broad, with multifid rays, arising under the first ray of the dorsal fin. Anal long, with subequal rays, the anterior being slightly longest. Caudal forked. The parietes of the abdomen silvery. Ovaries of a bright sulphur-yellow. Liver moderate. Stomach cylindrical, with a few short cæca. (The absence of cæcal appendages in the European species has, by some European writers, been made a part of the generic phrase.) Air-bladder oblong, linear, slightly dilated at its anterior extremity, where it terminates in a short tube communicating with the œsophagus. In the stomach, remains of shrimps and an atherine.

Color. Pale olive-green above the lateral line. Opercles and sides silvery. Obscure traces just below the lateral line, of a broad longitudinal satin-like band, extending the whole length of the body; the place of the ribs indicates unusually lustrous stripes, which disappear shortly after death. Upper part of the opercles near the nape, dark green. Caudal dark at the base, and with an obscure broad dusky marginal band. Dorsal and caudal fins light green. Pectorals, ventrals and anal light-colored, tinged faintly with bluish. Irides silvery. Bones of the head sub-diaphanous.

Length, 8·0. Depth, 1·5.
Fin rays, D. 11.0; P. 14; V. 9; A. 15; C. 19 $\frac{5}{5}$.

Individuals of this species are sometimes taken, a foot in length, but the average size on this coast is between five and six inches.

This beautiful and savory fish derives its popular name of *Smelt* from its peculiar smell, which resembles that of cucumbers. This is strongest when first taken out of the water, but it may be perceived by raising the opercles even when it has been some time out of water. This peculiar smell it possesses in common with the *Mallotus villosus* of the northern seas. It comes to us from the north in November and December, abounding in our salt-water streams, and is sold by measure in our markets. They are derived chiefly from the small streams emptying into Long Island sound, and from the Hackensack and Passaic rivers in New-Jersey. It appears to vary considerably from the European species, and is found along our coast from the mouth of the Hudson river to the coast of Labrador.

GENUS BAIONE.

A range of even teeth on the maxillaries; a shorter range on the intermaxillaries and the anterior part of the vomer. A series of long recurved teeth around the margin of the tongue. Branchial rays ten. Adipose fin posterior to the anal. Scales microscopic.

Obs. I propose this new subdivision, to admit a small fresh water species of the family Salmonidæ, that cannot be arranged with any of the published genera of which I have any knowledge. Its name is derived from βαιων, a small fish alluded to by ancient writers.

THE SPOTTED TROUTLET.

Baione fontinalis.

PLATE XX. FIG. 58. — (STATE COLLECTION.)

Characteristic. Blackish above; sides silvery; with seven to eight broad vertical black bands on the sides. Length one to two inches.

Description. Body elongated, subcompressed, with exceedingly minute, deeply imbedded scales, and only visible under a strong lens. Length of the body to its depth as eight to one.

The lateral line curves down from the upper angle of the branchial aperture; it is composed of a series of very minute rounded tubercles, continuous with the mucous pores on the head. Length of the head measured to the posterior margin of the opercle, to the total length, as one to five. The orbits large, encircled by a row of mucous pores; at the posterior part of the orbits, a series of these pores goes off on each side posteriorly, and becomes continuous with the lateral line; another transverse line connects these two over the basal line of the head. These series of mucous pores are scarcely evident in the living specimens. Eyes very large in proportion to the size of the body, 0·15 in diameter, and 0·1 apart. Mouth broad, rounded, and deeply cleft. A row of crowded minute even teeth on the maxillaries; a shorter range on the intermaxillaries, and a patch of similar minute teeth on the vomer. A series of long upright teeth on the edges of the tongue. The branchial rays ten and eleven on opposite sides.

The first dorsal arises at a point nearly midway between the end of the snout and the adipose dorsal; it contains eight slender branched rays, so far cloven down as to render them difficult to enumerate. It is higher than long, being 0·2 in length along the base, and 0·28 high. The adipose fin slender but distinct, 0·1 high, and nearer the end of the first dorsal than the tip of the caudal rays. Pectorals placed low down, with twelve rays, of which the second, third and fourth rays are longest; this fin is 0·3 long, its tips scarcely reaching the base of the ventrals. The ventrals feeble, contiguous, pointed, and placed beneath the first dorsal, with one simple and six branched rays. The vent is a longitudinal fissure with a tubercular margin, and covered by the ventrals when they are in repose. Anal quadrate, with nine rays, arising half an inch from the base of the caudal; it is 0·25 high, which is twice the length of its base. Caudal fin forked; its lobes rounded, and with numerous accessory rays.

Color. The general color is black above; silvery white on the sides and beneath. The dark color above, descends in a waving manner on the sides, occasionally becoming detached rounded spots. Along the sides are eight large vertical broad bands, sometimes irregular, occasionally oblong elliptical, not uniting with the dark color above; these bands become circular spots on the sides of the tail. First and second dorsal dusky, faintly maculated with brown. All the other fins tinged with orange on their outer margins.

Length, 2·0. Depth, 0·25.
Fin rays, D. 8.0; P. 12; V. 7; A. 9; C. 19 $\frac{1}{1}\frac{8}{8}$.

This pretty little fish inhabits clear running streams and springy morasses. It was first detected in a deep spring in Rockland county, by Mr. J. G. Bell, and will doubtless be found in other parts of the State. I have heard it called *Pigmy Trout* and *Trout Pig*. It is undoubtedly the smallest fresh-water species of the Salmonidæ.

GENUS SCOPELUS. *Cuvier.*

Body long and slender. Mouth and gills excessively cleft. Branchial rays nine and ten. Small teeth in both jaws; the edge of the upper jaw formed entirely by the intermaxillaries. Tongue and palate smooth. The first dorsal over the space between the ventral and anal. The adipose fin rudimentary.

THE ARGENTINE.

SCOPELUS HUMBOLDTI ?

PLATE XXXVIII. FIG. 121.

Argentina sphyrena. PENNANT, British Zoology, Vol. 3, p. 432, pl. 76.
Scopelus humboldti. CUVIER, R. A. Ed. Angl. Vol. 10, p. 432.
The Argentine, S. id. CLARKE, Lond. Mag. Nat. Hist. No. 13, 1838.
The Argentine, S. id. STORER, Report on the Fishes of Massachusetts, p. 110.

Characteristics. Several series of brilliant silvery points along the sides of the body and tail. Length two inches.

Description. Body oblong, much compressed. Lateral line almost imperceptible, nearly straight, commencing at the upper third of the opercle. Mouth widely cleft, with minute teeth in both jaws. Eyes large, 0·2 in diameter.

Color. The back, to the depth of about a line, green. Sides and gill-covers silvery. A series of circular metallic spots along the belly, from before the pectorals to the vent. Above these, another row; and behind the vent another, consisting of similar but smaller dots extending to the base of the caudal fin. Irides silvery.

Length, 2·1; of the head, 0·3.
Fin rays, D. 10.—; P. 17; V. 8; A. 15; C. 19.

But one living specimen has, as far as I am acquainted, been met with on our shores. It occurred at Nahant on the coast of Massachusetts, and is noticed by Dr. Storer, whose description is copied. Dr. Storer is silent respecting the spots on the opercle, and the slight ridge between the dorsal and base of the caudal, which represents the adipose fin in the European species. In this latter species, also, there are stated to be four series of metallic colored spots. The American species is, in all probability, distinct from that of the Mediterranean.

GENUS COREGONUS. *Cuvier.*

Mouth slightly cleft. Teeth exceedingly minute, or wanting. Scales large. Base of the dorsal less than the length of its anterior rays. Numerous cæca.

THE WHITE-FISH.

COREGONUS ALBUS.

PLATE LX. FIG. 198.

White-fish, Coregonus albus. LESUEUR, Journ. Acad. Nat. Sciences, Vol. 1, p. 231, extra plate.
The Attihawmeg, Salmo (Coregonus) albus. RICHARDSON, Faun. Bor. Am. Vol. 3, p. 195, pl. 89.

Characteristics. Bluish grey on the back, lighter on the sides, and white on the belly. Jaws and tongue with asperities; vomer and palate smooth. Length 18 – 20 inches.

Description. Body elongated, subcylindrical, somewhat compressed, slightly elevated before the dorsal fin. Head one-fifth of the total length, smooth, and flattened above. Scales large, orbicular, thin and deciduous. About eighty scales in the course of the lateral line, and twenty in an oblique series from the dorsal; numerous small ones ascend on the base of the caudal. Lateral line slightly arched, nearly straight. Eyes large, and nearly two diameters distant from the end of the snout. Tip of the snout blunt. Mouth small. Teeth scarcely perceptible to the touch. Pharynx smooth. Branchial arches with a row of bristles.

The dorsal fin two inches and a half high, and one and six-tenths along its base; the first three closely applied to the fourth, which together with the fifth is longest. Adipose broad at the base, where it is surrounded by small scales. Pectorals pointed, three inches long, the third and fourth longest, the lower rays very slender. Ventrals broad, arise under the tenth ray of the dorsal, and their tips reach to within 0·8 of the anal. The anal fin higher than long, shaped like the dorsal, and ending a short distance behind the adipose fin. Caudal forked.

Color. Greyish blue above, lighter on the sides; in certain lights, there is a play of colors on the sides.

Length, 17·0; of the head, 3·0.
Fin rays, D. 13.0; P. 17; V. 12; A. 13; C. 19 $\frac{6}{6}$.

This is the celebrated *White-fish* of the lakes, which is most abundant in Lake Huron, but is occasionally found in Lake Erie. It was named by Lesueur, but its first accurate describer was Richardson, whose plate I have copied. The brief notice given by Lesueur will apply to any and all the species. It is often salted and sent to the New-York market, where it is sold for eight cents per pound. It occurs as high as 72° north latitude.

THE COMMON SHAD SALMON.

COREGONUS CLUPEIFORMIS.

PLATE LX. FIG. 198.

White-fish of the Lakes, Shad Salmon, S. clupeiformis. MITCHILL, Month. Mag. Vol. 2, p. 321.
Herring Salmon, Coregonus artedi. LESUEUR, Journ. Acad. Vol. 1, p. 231.
Salmo (Coregonus) artedi. RICHARDSON, Faun. Bor. Amer. Vol. 3, p. 203.

Characteristics. Body elongated, compressed, arched above and beneath. Bluish above; silvery and yellow on the sides. Length one to two feet.

Description. Form elongated in the males, but deeper and more compressed in the females. Scales orbicular, large, and ascending high up on the caudal fin. Lateral line not very conspicuous, nearly straight. Head small, compressed, flattened above. Mouth small, with no teeth on the margin of the jaws. Nostrils double, and near the end of the pointed snout. The dorsal fin higher than long, even on its margin, and with twelve rays, of which the first two are simple and short. Pectorals long and pointed; the three lower ones very slender. Ventrals small, and placed under the posterior part of the dorsal. Anal under the adipose, and composed of fourteen rays. Caudal forked.

Color. Bluish, with silvery reflections above; with iridescent, pink, and yellowish on the sides; white beneath. Irides yellowish white.

Length, 15·0.
Fin rays, D. 12.0; P. 16; V. 12; A. 14; C. 19 $\frac{5}{5}$.

This species was named by Dr. Mitchill, but Lesueur's account, which appeared only a few weeks after, contains the first recognizable description. It occurs in Lakes Erie and Ontario, and in the smaller lakes in the interior of the State, which still communicate with our inland seas.

THE OTSEGO SHAD SALMON.

COREGONUS OTSEGO.

Salmo otsego, The Otsego Bass. CLINTON, Med. and Phil. Register, Vol. 3, p. 188, plate.

Characteristics. With numerous dusky longitudinal lines along the sides. Length one to two feet.

Description. Body elongate, subcylindrical, compressed. Back arched. Scales very small. Lateral line indistinct, straight. Mouth small, with a protuberant bifid upper lip. No teeth in the maxillaries, intermaxillaries, vomer, palatines or pharyngeals. The dorsal with nine? rays, three of which are imperfect. Adipose filamentous at the tip, caudal forked.

Color. Dusky above the lateral line; silvery beneath it. Dusky lateral stripes, as in the *Labrax lineatus*, or Striped Bass; these are about six or eight in number. Pupils black; irides silvery. Opercles silvery, spotted with yellow.

Length, 17·0. Depth, 5·0. Thickness, 1·0.

Having mislaid my notes on this species, I am compelled to use the very brief description given by De Witt Clinton. It is a very distinct and beautiful species. According to Mr. Clinton, it is nearly equal to any fish that swims, for exquisite and delicious food. It is among fishes what the grouse or canvass back duck is among birds: the flesh is fine, white and delicate. It appears to be peculiar to Otsego lake, and is daily decreasing in numbers. It is rarely taken by the hook, but has been taken by the seine to the number of five thousand at a draught.

(*EXTRA-LIMITAL.*)

C. tullibee. (Richardson, F. B. A. p. 201.) Compressed; belly rounded. Scales large, oblong. A small plate of minute teeth on the tongue. Length 14 inches. *Northern Regions.*

C. quadrilateralis. (Id. p. 204.) Subcylindrical, quadrilateral. Scales rhomboidal. No teeth. Length 18 inches. *Polar Sea.*

C. lucidus. (Id. p. 207.) Compressed. Scales transversely oval. No teeth. Length 18 inches. *Northern Regions.*

C. harengus. (Id. p. 210.) Compressed; back rounded; abdomen slightly flattened. Three rows of microscopic teeth on the tongue. Length 12 inches. *Lake Huron.*

FAMILY CLUPIDÆ.

Dorsal single. No adipose fin. Upper jaw formed as in the preceding family; in the centre by intermaxillaries, and on the sides by the labials. Body very scaly.

GENUS CLUPEA. *Cuvier.*

Body compressed. Scales large, thin, and deciduous. Tongue and vomer furnished with teeth. Under jaw longest.

THE COMMON AMERICAN HERRING.

CLUPEA ELONGATA.

The Herring of Commerce, C. harengus. MITCHILL, Am. Month. Mag. Vol. 2, p. 323.
Clupea elongata. LESUEUR, Journ. Acad. Nat. Sciences, Vol. 1, p. 234.
Clupea elongata, The Common Herring. STORER, Report on the Ichthyology of Massachusetts, p. 111.

Characteristics. Back and head deep blue, tinged with yellow. Tail with caudal pouches. Length 12 – 13 inches.

Description. Body lengthened, fusiform, compressed. Depth at the dorsal fin to the total length, as one to fourteen. Back slightly arched. Scales large, silvery and deciduous. Abdomen sharp, indistinctly serrated; about thirty spines in front of the ventrals, and fifteen behind them. Two scaly appendages on each side of the caudal fin. Head destitute of scales, and about one-seventh of the total length; a depression above, with numerous mucous pores. Eyes large, with a nictitating membrane, and two diameters apart. Mouth large. Jaws, palate and tongue furnished with teeth. Dorsal subquadrangular, longer than high. Pectorals short, rounded. Ventrals under the middle of the dorsal fin. Anal subequal, narrow, highest in front. Caudal small, forked.

Color. Back and head deep blue, tinged with yellow. Opercles yellowish, tinged with violet. Irides silvery; pupils black.

This species,* which rarely descends to the coast of New-York, is occasionally taken in considerable numbers in the waters south of Cape Cod. Of late, their numbers have much diminished, which is attributed by the fishermen, according to Dr. Storer, to torching them

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* As this species has been confounded with two species on the coast of Europe, we subjoin their diagnostic characters:

1. *C. harengus, the Common Herring.* Back dark and glossy blue. Belly distinctly serrated in the young, obsolete with age. Under jaw tipped with black. Base of the ventrals under the sixth dorsal ray. First ray of the dorsal fin exactly half way between the tip of the snout and the base of the middle caudal ray; if held up by the anterior dorsal rays, the head dips considerably. Vertebræ 56. Anal with 15 rays.
2. *C. pilchardus, the Pilchard.* Back bluish green. Belly smooth. Dorsal fin with its last ray equidistant between the tip of the snout and half way along the caudal ray; if held up by anterior dorsal rays, the body preserves its equilibrium. Vertebræ 55. Anal with 18 rays.

at night, by which the shoals are broken up, and the fish frightened away. The causes of the irregular appearance and disappearance of many species of this family are not yet understood, and the wildest conjectures are substituted as a cloak for ignorance. Thus, in some of the western islands of Scotland, their disappearance was attributed to the fires used in making kelp, although they appeared on other shores where these fires were also kept up. Another fancy is, that they are driven away by the firing of guns; and hence they have left the Baltic since the attack upon Copenhagen. So firmly is this believed, that no guns are allowed to be fired during the fishing season. Steamboats are also charged with driving away fish; and the answer to this is, that in Loch Fine, where a steamboat plies daily, they are abundant, while they have deserted other places where a steamboat never yet appeared. When the species above described first made their appearance in Long Island sound, in 1817, they were mistaken for the European herring, and were gravely stated to have followed the English squadron thither in the attack upon Stonington in 1814. The best satire upon these wild conjectures, is found in a statement made in the English House of Commons, to this effect: A clergyman on the coast of Ireland having signified his intention of taking the tithe of fish, it was considered to be so utterly repugnant to the privileges and feelings of the finny race, that not a single herring has ever since visited that part of the shore.

THE STRIPED HERRING.

CLUPEA FASCIATA.

Clupea fasciata, The Fasciated Herring. LESUEUR, Journ. Acad. Nat. Sc. Vol. 1, p. 233.
C. pusilla, Tiny Herring? MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 451 (young?)
C. fasciata, The Fasciated Herring. STORER, Massachusetts Report, p. 112.

Characteristics. Seven or eight blackish blue lines at the side of the back. Length two to nine inches.

Description. Body compressed; back straight; breast and abdomen forming a bow downwards as far as the tail. A rounded notch at the bottom of the divisions of the tail, of which the lower lobe is longest. The entire length of the body is about six times the length of the head, which is not equal to the depth of the body. Snout short; jaws equal; maxillaries of middling width, scarcely reaching beyond the centre of the eye, which is round, near the end of the snout. Opercle parallelogramiform, slightly oblique, and depressed at the lower edge. Dorsal as high as the width of the base. Pectorals acute, rather long. Ventrals somewhat behind the front of the dorsal, which is large and truncated. Anal long, subequal. Lateral line scarcely visible. Branchial rays seven.

Color. Blue on the back; lighter at the sides, and of a silver white under the abdomen, breast and tail. Yellow tints are reflected from the scales upon the opercles, base of the tail and fins. Seven to eight lines, of a blackish blue color, at the sides of the back; deeper towards the back than the abdomen, where they disappear.

Length, 1·0–9·0.
Fin rays, D. 18; P. 16; V. 9; A. 18; C. 22 $\frac{4}{6}$.

This is a rare but well defined species, occurring south of Cape Cod, and will in all probability be found on the coast of New-York. I have taken the description as given by Lesueur. I am inclined to suspect *C. pusilla* of Mitchill, or the *Tiny Herring*, to be the young of this species.

THE GREEN HERRING.

CLUPEA VIRESCENS.

PLATE XIII. FIG. 37.

Clupea halec, New-York Herring? MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 451. (Var.?)

Characteristics. Bright green on the back. A black spot behind the upper angle of the gill openings. Length six inches.

Description. Body much compressed; its greatest depth to its length as one to four. Back arched. Abdomen cultrate, much serrated, with nineteen strong spines anterior to the ventrals, and twelve between these latter and the vent. Scales large, orbicular, and very deciduous. Lateral line straight, indistinct, but may nevertheless be traced. Eyes large, rather more than their diameter apart. Head flattened above, and bounded by two parallel elevated lines. Branchial rays seven. The dorsal fin quadrangular, highest in front, its margin slightly concave; the first two rays simple, shorter than the third and fourth, which are longest. Pectorals placed low down, long and pointed, and composed of sixteen rays. Ventrals fan-shaped, and placed under the middle of the dorsal fin. Anal long and subequal, its anterior rays longest, its margin slightly excavated. Caudal with long pointed lobes, and deeply forked. Cæca numerous. Air-bladder large, and ending some distance beyond the vent.

Color. Back green, passing into a lustrous bright green, and forming a longitudinal stripe of the same above the lateral line. Sides silvery. Irides white, varied with brown. Summit of the snout dark brown. A vertical black mark behind the upper part of the branchial aperture. Dorsal and caudal fins light olive-green, bordered on their margins with dark brown. Anal faintly tipped with black on the tips of a few of the first rays; the remaining rays faint yellowish white.

Length, 6·0. Greatest depth, 1·5.
Fin rays, D. 16; P. 16; V. 9; A. 17; C. 19 $\frac{5}{5}$.

The specimen from which this description is made, was taken in October by a seine, with several others in the Bay of New-York. It is called sometimes *Greenback* and *Fall Herring*.

THE LITTLE HERRING.

CLUPEA PARVULA.

The Little Herring, Clupea parvula. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 452

Characteristics. Brownish above, and without spots or stripes. Almost transparent. Length six inches.

Description. "A delicate, and as it were, a semi-transparent appearance. Tail forked. "Belly serrated. Branchial rays six.

"*Color.* A little greenish about the head, gills and eyes; but neither green nor blue on the "back or sides. Back of an unmixed, though not deep brown, which passes through regular "gradations of hue to a silvery whiteness on the sides and belly.

"Length 6·0.
"Fin rays, D. 14; P. 14; V. 9; A. 18; C. 21."

I have copied this short note of a species, which figures in Mitchill's Memoir on the Fishes of New-York. I have met with nothing like it. It does not appear, from the description, whether it should be referred to this or the succeeding genus. Allied to it appears the *Brit* of Dr. Storer, which is thus described:

THE BRIT.

CLUPEA MINIMA.

C. minima. PECK, Belknap's Hist. New-Hampshire. Vol. 3, p. 130.
C. id., The Brit. STORER, Report on the Fishes of Massachusetts, p. 113.

Characteristics. Black above; dark green and silvery on the sides. Abdomen serrated. Length one to four inches.

Description. Length of the head one-fourth the length of the body, gradually sloping from the occiput to the snout. Gill-covers large, silvery, seeming to form one large plate. Lower jaw rather projecting beyond the upper. Diameter of the eye equal to one-sixth of the length of the head. Tail forked.

Color. Back nearly black; upper part of the sides dark green. Sides silvery, with roseate and golden reflections. In the younger specimens, the dorsal ridge is a black line, and the distance between it and the lateral line, which is situated very high upon the sides, is of a light green, sprinkled with darker points. The lateral line arises upon a line with the upper angle of the opercle, and runs along very near the back, the length of the body.

Length, 1·0 – 4·0.
Fin rays, D. 10; P. 15; V. 5; A. 12; C. 18.

This appears in some years in incredible numbers on the shores of Massachusetts, according to Dr. Storer, and will probably be found on our own coast.

Dr. Mitchill has indicated, rather than described, two small herrings from the waters of New-York, which may be the young of other species. The notes which he has left do not enable me to place them with sufficient accuracy, but I leave them provisionally here. I have not met with them.

THE SATIN-STRIPED HERRING.

CLUPEA VITTATA.

Satin-striped Herring, C. vittata. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 456.

Characteristics. With large projecting upper jaws, small lower jaws, silver-striped sides, and forked tail. Length 3½ inches.

Description. "Length about three and a half inches; depth rather more than half an inch. Inhabits the salt water, and resembles an atherine. The upper jaw is much more considerable in size than the lower, and terminates in a distinct nose or snout. Beneath it, the lower mandible is received, and shuts closely. The mouth has no proper teeth, but both the jaws have very minute and exact serrated edges. The throat, on examination, is found to be surrounded with a row of bristles, long and diposed funnel-wise, and investing the sides of the tongue. One dorsal fin near the middle of the back. The vent is rather nearer the tail than to the head. The ventrals small, and six-rayed. Eyes large and yellowish. Gill-covers silvery white. Belly carinated, and moderately serrated. Branchial membrane, eleven or twelve rays. Anal fin about twenty-one."

This can scarcely be identical with the *C. argentina* of Swainson, from Brazil; but the characters are too meagre to enable us to make a comparison.

THE BLUE HERRING.

CLUPEA CŒRULEA.

C. cærulea, The Blue Herring. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 457.

Characteristics. "With bluish complexion, large head, forked tail, and small pectoral and abdominal fins." Length three inches.

Description. "Length three inches; depth nearly one, being a deep fish in proportion to his length. The scales are large for a fish of his size, and are readily deciduous. The skin is free from spots or stripes, and is of a bluish color. This is less considerable on the belly than on the back. The eyes and head are large. The jaws about even. Tail deeply forked. Belly sharply and delicately serrated. Pectoral fins small; ventral smaller. Body in some

degree semi-transparent. He may possibly be a variety of one of the preceding species; but I have thought it proper to mention him by himself."

(*EXTRA-LIMITAL.*)

C. harengus? (RICHARDSON, F. B. A. Vol. 3, p. 229.) Labials minutely toothed, with minute teeth on the vomer. Back green and gold. Length 15 inches. *Arctic Seas.*

GENUS ALOSA. *Cuvier.*

Characters of the preceding, but the tongue and roof of the mouth smooth, and destitute of teeth. Upper jaw with a deep notch in the centre.

THE AMERICAN SHAD.

ALOSA PRÆSTABILIS.

PLATE XV. FIG. 41.

Clupea alosa, Shad. SCHŒPFF, Beobachtungen, Vol. 8, p. 180.
C. id. Shad. BELKNAP, Hist. N. Y. Vol. 3, p. 130.
C. id. MITCHILL, Report in part, &c. p. 22.
The Shad, Clupea alosa. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 449.
The Sprat Herring, C. indigena. ID. Trans. Lit. and Phil. Soc. Vol. 1, p. 454. (Young?)
Alosa vulgaris, The Common Shad. STORER, Ichthyology of Massachusetts, p. 116.

Characteristics. The largest American species of the genus. With one or more dark spots on the sides. Caudal pouches. Length one to two feet.

Description. Body oblong, compressed; its thickness being nearly one-half of its depth; the back rounded. Scales large, caducous, transparent, rhomboidal on the sides, rounded on the abdomen. No lateral line obvious. Head small, smooth, and its length, compared to the total length, as one to five. Lower jaw closing into the upper, and when dropped, apparently longer. The labials large, narrowed above, and, under the lens, faintly denticulate on their lower edges. The upper jaw smooth, with a central notch. Tongue distinct, smooth and pointed. Eyes moderate; two diameters distant from the extremity of the snout, and a single diameter apart. Nostrils nearly equidistant from the central notch, and the middle of the orbit. A triangular transparent space anterior to the eyes. Belly carinate, sharply serrated throughout; the serratures strongest between the ventrals and anal.

The dorsal fin quadrangular, with a base two inches and a quarter long; the first ray projects slightly beyond the skin, the second slightly longer, the third twice the length of the preceding, the fourth still longer, and the fifth, which is two inches long, exceeds all the others in length. All these rays are strong, simple and subspinous; the remaining rays branched; the last ray nearly horizontal, and at the same distance from the end of the tail, that the first ray is from the point of the nose: the fin itself is emarginate, the last ray being

longer than the twelfth. On each side of its base is a series of smaller scales, not conforming to the general plan. Pectorals moderate, with a broad accessory scale beneath, and a slight groove above; its first ray is about an inch above the thoracic outline, simple, and shorter than the two following. Ventrals feeble, pointed, near the edge of the belly, and one inch behind a line vertical from the first dorsal ray. It has a broad emarginate accessory scale above, with a subacute tip; the first ray simple, with a minute rudimentary ray attached to its base; the second longest, and, with the remainder, branched. Anal long, low and emarginate, commences about five inches behind the base of the ventrals; and the length of its base, compared with that of the dorsal, is as ten to nine; third and fourth rays longest, the last nearly horizontal and equal in length to the sixth, the intermediate rays being shorter. The first ray simple, about 0·4 long; the succeeding ray also simple, and nearly as long as the third; the remainder branched. The caudal deeply forked, with minute scales ascending high up on the rays, which are much branched, with the exception of the external entire rays. They are all closely connected to each other, which renders their enumeration difficult. This difficulty is increased by the presence of two membranous plates, or rather scaly appendages, the use of which is entirely unknown. It may possibly serve as subsidiary to mucous secretion. These plates (see figure) are on both sides of the fin, two on each side; they are an inch long, a quarter of an inch wide, narrow at the base, and wider and rounded at the tips, which are free. Counting from the outer edge of the fin, the scale is attached by one edge to the seventh ray on each side; included between this and the corresponding scale opposite, is a bundle of longitudinal fibres, the free edges being open toward the centre of the tail.

Color. Head and back dark bluish. Sides of the body greenish, with blue and yellowish changeable metallic reflections. Opercles with golden metallic tints, becoming greenish beneath. An irregular dark spot, more or less distinct, behind the upper margin of the opercles. Dorsal and caudal fins dark greenish brown. Pectorals tinged with dusky brown. When the scales are detached, a series of from five to eight dark spots are observed along the sides. When the fish has been kept for some time, these spots are apparent through the scales, but in the fresh unscaled fish are not seen. In stale fish, moreover, there are traces of parallel lines along the sides. Pupils black; irides yellow.

Length, 21·0. Depth, 6·0. Weight, 5 pounds.
Fin rays, D. 17; P. 16; V. 9; A. 20; C. 20 $\frac{2}{2}$.

This beautiful and savory fish has hitherto been confounded with the Shad of Europe. There are two species, one the *A. finta*, and the other *A. vulgaris*, which, until the time of Cuvier, had been strangely confounded. The first is thirteen inches long, with distinct teeth in the upper jaw, and a row of dark spots along the sides; a coarse, dry and insipid fish. The second, the *A. vulgaris*, or the *Allice Shad* of Yarrel (Vol. 2, p. 136), approaches more nearly to our own in size and flavor. Its jaws are toothless, its sides without spots, and it has, like our own Shad, a large dusky spot behind the opercle. Without the means of making a direct comparison, we may note the following differences, suggested by the minute description of

that excellent observer Mr. Yarrel. In the European Shad, the opercle is roughened, with a number of raised lines placed obliquely; color above bluish grey. In our Shad, the scales are rhomboidal; the dorsal fin differs in the number, arrangement and position of its rays; the pectorals have an accessory scale, and the first ray is shorter than the two following; the position of the ventral is far behind the first ray of the dorsal; the base of the anal shorter, with other differences which occur to the careful observer.

Unlike most of the genus which appear to reside in the northern seas, this species comes to us from the south to deposit its spawn. We infer this to be the fact, from the chronological order of its occurrence along our coast. At Charleston, according to my friend Dr. Holbrook, they appear in January or February, later at Norfolk, and here the latter end of March or beginning of April, their appearance being accelerated or retarded by the mildness or severity of the season. On the coast of Massachusetts, they appear during the month of May, and farther north they have been observed still later. There are several varieties, which have suggested various popular names. On the coast of Carolina, the fatter ones have the tail swollen, and are called *Club-tails*. Formerly, a large variety, supposed to be an old fish, and weighing from ten to twelve pounds, were frequently taken in the Hudson river, under the name of *Yellow-backs*. They were distinguished immediately by their large scales and the brassy color of their backs, and are now seldom seen. In those which ascend the Connecticut, the bodies are more cylindrical, with a quantity of mucus distributed over the body, which gives it a slimy appearance obvious to the touch and the eye. They are considered superior to those on our coast. Upon entering the Hudson river, they ascend one hundred and fifty miles to spawn. They descend in the latter part of May, when they are called *Back Shad*, and are lean and scarcely fit to eat. In abundant seasons, they are sold at from six to ten dollars per hundred, and are packed away in salt. Of late years, it has been observed that they are more scarce, being driven away by the increasing number of nets set for their capture. Thirty years since, they were caught in large fyke or hoop-nets, which could only be set in shallow places, leaving the main channel of the river open. These, however, have been superseded by gill-nets, which are attached to long spears, and often set in from seven to ten fathoms of water, nearly blocking up the whole channel. It is easy to foresee, that before many years, the shad will be driven entirely from the river. We know of several individuals who have a capital of from six to eight hundred dollars invested in nets, boats, etc. for this fishing; and from information derived from various sources, have no doubt, that along the course of this river, there is a capital invested in the shad fishery alone of nearly half a million of dollars.

I am not able to state whether the Shad is found farther north than the coast of New-Hampshire.

THE AMERICAN ALEWIVE.

ALOSA TYRANNUS.

PLATE XIII. FIG. 38.

Clupea tyrannus, Bay Alewife. LATROBE, Am. Phil. Soc. Trans. Vol. 5, p. 77, pl. 1.
C. vernalis. MITCHILL, Report, p. 22. ID. Trans. Lit. and Phil. Soc. Vol. 1, p. 454.
Alosa vernalis, Spring Herring or *Alewive.* STORER, Massachusetts Report, p. 114.

Characteristics. Indistinct longitudinal lines on the sides. A dark spot on the shoulder. Pectorals without an accessory plate. Anal nearly even. Length eight to ten inches.

Description. Body elongate, strongly compressed. Length of the head, to the total length, as one to six. Depth of the body at the dorsal fin, to the total length, as one to four. Scales very large and deciduous. Lateral line indistinct. Abdomen strongly serrated, more especially behind the ventrals. Head small, flattened between the eyes. Mouth very protractile; the gape opening upwards, with the upper jaw notched in the centre; labials slightly roughened. Eyes large, two diameters from the end of the nose. Nostrils simple, near the edge of the upper jaw. Tongue long, thin and smooth. Branchial arches angular, with long filaments on the first arch; smaller on the others. Branchial rays seven. Dorsal fin quadrangular, slightly longer than high; the first and second rays short; the third longest, the margin slightly concave. (In Latrobe's figure, the dorsal is omitted.) Pectorals long, subacute, and without an accessory plate. Ventrals small, with a feeble and indistinct scale on its outer side. Anal low, with subequal rays. Caudal forked. Cæca numerous. One which I examined, had its stomach filled with shrimps.

Color. Back blue-green, approaching to purple; sides silvery. From four to six indistinct dusky lines along the sides. Head dark green above, and the tip of the lower jaw of the same color. Opercles yellow.

Length, 8·0 – 10·0.
Fin rays, D. 17; P. 15; V. 9; A. 18; C. 21 $\frac{3}{3}$.

We do not adopt the first name proposed by Peck (*serrata*) in Belknap's History of New-Hampshire, as it is a mere name without any specific character, or clue to its identity. Latrobe's name, although absurd and unmeaning, must, however, be retained.

The Alewive appears in great quantities in the Chesapeake, from March to May. In our waters, they appear with the shad about the first of April, but are never sufficiently numerous to form a separate fishery. On the coast of Massachusetts, they again appear to be numerous. According to Dr. Storer, five thousand barrels were cured on that coast in the year 1836.

THE MOSSBONKER.

ALOSA MENHADEN.

PLATE XXI. FIG. 60.

Bony-fish or *Mossbonker*, *Clupea menhaden*. MITCHILL, Report in part &c., p. 21.
Hard-head or *Marsbankers*, *C. menhaden*. ID. Trans. Lit. and Phil. Soc. Vol. 1, p. 453.
The Menhaden, *Hard-head*, *Alosa menhaden*. STORER, Massachusetts Report p. 117.

Characteristics. Silvery; no stripes; a humeral spot. A double accessory ray to the ventrals. Abdomen serrated behind the ventrals. Length 10 – 14 inches.

Description. Body much compressed; its height to its length as one to four nearly. Abdomen cultrate, with a fissure along its edge, indistinctly serrated before the ventrals, sharply serrate behind. Scales large, elliptical, distinctly and evenly ciliate on the free margins; on the back, smaller and more crowded; on the nape, the scales have longer unequal ciliæ. No appearance of a lateral line. Head large, compressed, one-third of the total length; the opercles with curved and radiating striæ. Mouth large; the upper jaw emarginate on the side. The gill membrane on one side folds over its opposite, with five slender cylindrical and three larger and flat rays. Branchial arches four, with a small rudimentary one in front, all angular, and with long minutely fringed filaments. Eyes nearly covered by a nictitating membrane. Tongue soft, white, minutely punctate with black.

The dorsal fin long, emarginate; the first three rays simple, articulated; the anterior being very short, the remainder branched: first branchial ray highest, the last higher than the four preceding. This fin is concave on its margin, and is placed in a sheath. Pectorals long and pointed, on a line with the margin of the opercles; the first ray simple; the accessory plate large, and as long as the fifth ray. Ventrals feeble, short, fan-shaped, lying under the anterior portion of the dorsal, with double accessory plates. Anal long and low, the two first rays simple, the first shortest; the last ray longer than the fourteen preceding. Scales covering the base of the rays, so as to form a sort of sheath. Caudal forked, much branched, and with numerous accessory rays. Scales extending high up on the fin, and very minute ones distributed almost to the tip. Abdomen covered internally with a black pigment. Intestines long and convoluted. Cæca numerous, attached to a stout muscular stomach, lined with a white rugose membrane, covered with numerous papillæ. Air-bladder simple.

Color. Summit of the head and back greenish; silvery on the sides. In the plates, more of a yellow hue is given to this fish than belongs to him. A dark brown spot on the shoulders, behind the opercles. Irides yellow. A space anterior to the eyes so translucent as to permit opaque objects to be seen through on the other side.

Length 8·0 – 14·0.
Fin rays, D. 20; P. 16; V. 6; A. 22; C. 20 $\frac{4}{4}$.

This fish is known under the various names of *Bony-fish*, *Hard-head*, *Mossbonkers* (or as

it is pronounced by our Dutch inhabitants, *Morsèbonkers*), *Panhagen* and *Menhaden*; the last being the name given by the Manhattans, and *Panhagen* (pronounced *panhangen*) the Narraganset epithet. At the east end of the island, they are called *Skippangs* or *Bunkers*. Although seldom eaten, as it is dry, without flavor and full of bones, yet it is one of the most valuable fish found within our waters. Its use as a manure is well known in the counties of Suffolk, Kings and Queens, where it is a source of great wealth to the farmer who lives upon the seacoast. They are used in various ways: for indian corn, two or three are thrown on a hill; for wheat, they are thrown broadcast on the field, and ploughed under; although it is not uncommon to put them in layers alternately with common mould, and when decomposed, spread it like any other compost. Its effects in renovating old grass fields, when spread over with these fish at the rate of about two thousand to the acre, are very remarkable. Its value, however, as a manure, has one drawback in the abominable and unhealthy stench which poisons the whole country, and according to the testimony of some medical writers, lays the foundation of dysenteries and autumnal fevers. They appear on the shores of Long island about the beginning of June, in immense scholes; and as they frequently swim with a part of the head above or near the surface of the water, they are readily seen and captured. They are commonly sold on the spot at the rate of two dollars the waggon load, containing about a thousand fish. The largest haul I remember to have heard of, was through the surf at Bridgehampton, at the east end of the island. Eighty-four waggon loads, or in other words, 84,000 of these fish, were taken at a single haul. On the coast of Massachusetts, they are used as bait for mackerel, cod and halibut; and many are packed away for exportation to the West Indies. According to Dr. Storer, in 1836, 1488 barrels were thus salted down for exportation.

I am not aware that its geographical limits pass beyond the coast of New-Hampshire on one side, and Chesapeake bay on the other.

AUTUMNAL HERRING.

ALOSA MATTOWACCA.

PLATE XL. FIG. 127.

Clupea mattowaca, Long Island Herring. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 451.
C. mediocris, Staten Island Herring.

Characteristics. Silvery, with a series of dark rounded spots on the sides. Tongue with a band of teeth. Caudal pouches. Length one to two feet.

Description. General form of the herrings. Height to the total length as one to four. Back regularly arched throughout. Scales large, deciduous, rounded, with minute concentric striæ, and extending high up on the lobes of the caudal. Belly convex, serrated; fifteen spines behind the ventrals, and twenty-two in front. Eyes large, prominent; the margin of the orbits in the facial line. Nostrils slightly nearest the snout. Upper jaw with a deep emargination. Lower jaw longest, with a small prominence at its tip. Tongue free, elevated in the centre, obtusely pointed, with a band of asperities in its centre, composed of minute

conical teeth; the band ending in a point in front. Branchial rays seven; the aperture widely cleft. Opercle with rugose radiations on its surface; its edge nearly vertical, with a broad and slight emargination.

The centre of the dorsal fin is midway between the tip of the snout and the fork of the caudal fin; it is quadrate, concave on its margin, highest in front, and its height equal to its base; the first four simple, the first very slender and 0·3 long, thence gradually increasing in length to the fourth, which is slightly longer than the two following branched rays; the rays then gradually decrease in length to the penultimate, which is shorter than the last ray. Pectorals low down, pointed, falcate, with one stout simple articulated and fifteen branched rays; a long pointed accessory plate beneath. Ventrals under the dorsal, with a broad and pointed accessory plate; the membrane allows the tips of the rays to be distinct. Anal long, slightly elevated in front; its anterior portion lies in a groove formed by the scales. The caudal deeply forked, with two oblong elliptical thin scales on each side, forming pouches similar to what has been noticed in the American Shad and Herring. These pouches will probably be the foundation of good generic characters.

Color. Bluish green on the back; and when the scales are detached, a series of four or five black spots, which are sometimes lengthened into short transverse bars, extending from the head to the tail, and are sometimes evident before the scales are removed. Beside these, there is a series of five large roundish dark-colored spots on the fore part of the body, extending to beneath the centre of the dorsal fin. A larger black blotch in a line with these, on the upper part of the humeral bone. Summit of the head hyaline, bounded by two parallel lines. Pectorals, ventral and anal whitish. Dorsal and caudal dark olive-brown. Tongue and tip of the lower jaw blackish brown. Irides silvery; pupil jet black, its upper part mottled with brown.

Length, 12·0. Depth, 0·3.
Fin rays, D. 18; P. 16; V. 9; A. 20; C. 20 $\frac{3}{3}$.

The *Autumnal* or *Fall Herring*, or *Shad Herring*, is a common fish in our waters in the months of September, October and November. I have seen a few as early as July in our markets, which were brought from the Connecticut river, where they are called *Weesick*. The trivial name given by Mitchill, was derived from the aboriginal name of the island *Mattowaka* or *Matowax*.*

The specimen described above, is about the medium size. The largest I have heard of, did not exceed two feet in length.

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* The name given to the island by the Delawares, was *Sewanhackee*, or the *Isle of Shells;* in allusion to the quantities of shells which furnished their wampum.

THE SLENDER HERRING.

ALOSA TERES.

PLATE XL. FIG. 128. — (STATE COLLECTION.)

Characteristics. Body cylindrical. Ventrals behind the dorsal. Length six or seven inches.

Description. Body elongated, cylindrical. Length of the head to the total length, as one to five nearly; greatest depth one inch. Scales large, orbicular, deciduous; ascending on the caudal fin. A very long and slender accessory scale to the pectorals; a short and rounded one to the ventrals. Lateral line indistinct. Head long and pointed, with a long and deep furrow on the summit, terminating in front in a point: this furrow has a central carina (see figure). Orbits large, 0·5 in diameter, and distant one diameter from the tip of the snout; its upper margin somewhat prominent. Nostrils contiguous, vertical; the posterior largest. The mouth protractile, large; the edges of the maxillaries armed with microscopic teeth. Tongue long, pointed, with asperities on its surface. A distinct notch in the upper jaw. Opercles large; the posterior margin of the opercle with a silvery membrane. On the margin of the suborbital, are three or four flat truncated radiating rays.

The dorsal fin rather higher than long, arising at a point midway between the tip of the snout and a point vertical to the last anal ray: the two first longest, thence rapidly decreasing to the thirteenth; the last rays feeble, slightly longer than their antecedents; the margin concave. Pectorals low down, long and falcate. Ventrals broad; their rays subequal, with an intervening broad plate; they are nearly equidistant between the first rays of the dorsal and anal. Anal short, longer than high, concave on its margin; the anterior and posterior rays subequal, the first ray very short.

Color. Bright silvery; darker above, with a tinge of blue and yellow on the flanks. Sides of the head metallic silvery, mixed with cupreous. Irides golden. Dorsal and caudal tinged with yellow; the remaining fins transparent, feebly punctate with black.

Length, 7·0; of the head, 1·5.
Fin rays, D. 19; P. 15; V. 10; A. 12; C. 19 $\frac{6}{6}$.

This is a rare species, and I have never met with more than one specimen. It was taken with a seine in the harbor of New-York, in the latter part of October. I am inclined to suspect that it is a southern species, from the season at which it was taken, and its association with numerous specimens of the *Saurus*, to be hereafter described.

THE SPOTTED SHADINE.

ALOSA SADINA.

PLATE XL. FIG. 129.

The New-York Shadine, Clupea sadina. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 457.

Characteristics. A dark humeral spot. Abdomen faintly serrated in its whole length. No caudal pouches. Length six to twelve inches.

Description. Resembles the Common Shad in its form, compressed; branchial rays and emarginate upper lip. Length of the head to the total length as one to three, and equal to the depth of the body. Scales on the back, small and crowded; larger on the sides, and becoming smaller on the tail, which they cover to some distance up the rays. Lateral line indistinct. Tongue smooth; the filaments of the branchial arches nearly fill the mouth. Belly faintly serrated; (in the figure, too much exaggerated.)

Dorsal fin concave on its margin; highest in front, terminating nearly over the origin of the anal. Pectorals with a diaphanous scale, nearly as long as the fin. A similar scale above and behind the ventrals, which are very short, feeble and famose.

Color. Greenish and blue above, with metallic reflections. Sides and belly silvery, the latter with a faint tinge of pink. Opercles yellow and gold. A dark green rounded spot, almost approaching to black, on the shoulder, just behind the upper part of the branchial aperture.

Length, 6·0 – 12·0. Depth, 3·0 – 4·0.
Fin rays, D. 18; P. 18; V. 7; A. 21; C. 16 $\frac{3}{3}$.

I have referred this, with some misgivings, to the *sadina* of Dr. Mitchill, which he describes vaguely enough as "neat, taper and slender." In a list of fishes which I published a few years since, I changed *sadina* (on account of its being liable to be confounded with *sardina*) to *notata;* but farther reflection has satisfied me that I have no right to make the change. In the *Fauna Boreali Americana*, the author places Mitchill's *sadina* under *Engraulis;* but I know not upon what authority. The ventrals are certainly not in advance of the dorsal, nor does the mouth extend beyond the orbits. Indeed, I know of no American *Engraulis*. Our species does not appear to be common. It was taken in the harbor of New-York in November, and was brought to me for a curious variety of the *menhaden*, from which it differs by its large head, relative size and position of the dorsal and anal, absence of pouches, and general physiognomy.

GENUS CHATŒSSUS. *Cuvier.*

The last dorsal ray prolonged into a filament. Mouth edentate.

THE SPOTTED THREAD HERRING.

CHATŒSSUS SIGNIFER.

PLATE XLI. FIG. 132.—(STATE COLLECTION.)

Characteristics. Back with three or four dusky lines. A round black spot on the shoulder, behind the branchial aperture. Anal distinct. Length 8 – 12 inches.

Description. Body compressed, elliptical; total length to the depth as one to three nearly. Scales large, irregularly rounded, deeper than long, and covering the base of the anal rays. Abdomen serrate, with thirteen distinct rhomboidal acute scales between the ventrals and the vent, and eighteen smaller, scarcely prominent ones anterior to the ventral fins. Head small, nearly one-fifth of the total length; its summit plane. Eyes large, prominent, nearer the tip of the snout than to the edge of the branchial aperture. Upper jaw broadly emarginate; lower jaw longest, with a broad expansion above, which is received within the upper jaw. The point of union of the branchial rays prominent; the posterior branchial ray much dilated. Opercle large, rounded above; margin vertical, rounded above, and with deep emargination between its lower angle and the second posterior branchial ray. Tongue small, distinct, smooth.

The dorsal fin sub-triangular; the first short, 0·2 long; the second, third and fourth rays successively higher and simple; the fifth longest; from this, the branched rays descend in a broadly emarginate line to the last, which is prolonged into an articulated filament, equal in length to the greatest depth of the body; at the base of this ray, and behind it, is a small tubercle. Pectorals feeble, falciform, and of eighteen rays; beneath it a rudimentary accessory plate. Ventrals very short, near the edge of the abdomen, and with its base under the twelfth dorsal ray; these fins are also furnished with slight accessory plates. Anal very low, but distinct; the last ray simple, articulate, and longer than the preceding. Caudal deeply forked; the external entire ray filamentous. Branchial rays seven.

Color. Bluish above, with a series of dark points along the sides of the back, forming four or five longitudinal lines. A round black spot behind the upper part of the branchial aperture. Pectorals, ventrals and anal white. Dorsal and caudal yellow; the membrane finely punctate with black, and bordered with dusky. Irides white varied with yellowish.

Length, 8·0. Greatest depth, 2·5.
Fin rays, D. 19; P. 18; V. 8; A. 21; C. 19 $\frac{3}{3}$.

The *Thread Herring* can scarcely be confounded with the *C. thrissa* of Bloch. It is more closely allied to the *Megalops oglina* of Lesueur, but from this it is sufficiently distinct. It

appears in our waters about the beginning of September, where it is often called the *Shad Herring*. It has also the names of *Thread Herring* and *Thread-fish*, in allusion to its last filamentous dorsal ray.

(*EXTRA-LIMITAL.*)

C. oglina. (LESUEUR, Ac. Sc. Vol. 1, p. 359.) Back almost straight; with three longitudinal black bands on each side. Anal fin hardly visible. Dorsal not emarginate. Length 8 inches. *Newport Harbor.*

C. cepedianus. (ID. p. 361.) Pectorals reaching beyond the base of the ventrals, which are placed anterior to the dorsal. Length eight to twelve inches. *Delaware* and *Chesapeake.*

C. ellipticus. (KIRTLAND, Zool. Ohio, p. 195.) *Hickory* or *Gizzard Shad.* Undescribed. *Ohio River.*

GENUS HYODON. *Lesueur.*

Form of the preceding. Scales large, deciduous. Abdomen thin, trenchant, but not serrated. Dorsal and anal nearly opposite. Branchial rays eight or nine. Teeth minute and curved, on the jaws, tongue, vomer and palatines. Eyes very large.

THE RIVER MOON-EYE.

HYODON TERGISUS.

PLATE XLI. FIG. 130. — (CABINET OF THE LYCEUM.)

Hiodon tergisus. LESUEUR, Journ. Acad. Nat. Sc. Vol. 1, p. 366.
H. tergissus, Moon-eyed Herring. KIRTLAND, Zoology of Ohio, p. 170 and 195.

Characteristics. Anal large and rounded anteriorly, with its posterior portion low. Lateral line nearly straight. Dorsal margin concave. Length 9 inches.

Description. Body compressed; the dorsal outline very slightly arched from above the branchial aperture, thence descending to the tip of the snout, forming a slightly concave profile. Scales large, caducous, membranous on their free edges, and with three radiating elevated lines; the radical portion striated in radiating lines, irregularly truncate on the margin. The scales ascend high up on the base of the caudal. Head small. Opercle with a slight notch near its upper margin, which is filled up with a membrane. Eyes very large, and nearly filling up the whole space between the angle of the jaws and the upper part of the head. Snout in front descending almost vertically. Nostrils double, contiguous, patent; both nearer the point of the jaw than to the eyes. Conic teeth in a single row above; in several rows on the lower jaw. Tongue with several series of teeth, of which the outer on each side are largest. Teeth also on the vomer, and very minute ones on the palatines.

The dorsal fin with the first three rays simple, the fourth and fifth longest, the twelfth shorter than the following; this fin arises shortly anterior to the anal. Pectorals 1·3 long,

with the tips reaching to within 0·4 of the base of the ventrals; with two simple rays. Ventrals broad, with a pointed accessory scale. Anal fin long; its first five rays short, successively longer; the two last rays longer than the preceding; the sixth ray longest, thence gradually decreasing to the seventeenth; a few rays subsequent to this are subequal.

Color. Back bluish; sides silvery. Fins tinged with yellow. Opercle silvery, with cupreous reflections. Base of the caudal rays dusky.

Length, 9·0; of the head, 1·8. Depth of the ventrals, 2·5.
Fin rays, D. 15; P. 15; V. 7; A. 29; C. 18 $\frac{7}{7}$.

This species, which was first described by Lesueur from the Ohio, I observed in the Allegany river in this State. It is known under the popular names of *Herring*, *River Herring*, and *Toothed Herring*. Very indifferent food.

THE LAKE MOON-EYE.

HYODON CLODALIS.

PLATE LI. FIG. 164. — (STATE COLLECTION.)

Hiodon clodalus. LESUEUR, Journ. Acad. Nat. Soc. Vol. I, p. 367. Pl. 14.
H. id., The Larger Herring. KIRTLAND, Report Zool. Ohio, p. 195.

Characteristics. Elongate, compressed. Dorsal with its margin sinuous. Back with a regular curve. Length 7 inches.

Description. Dorsal outline forming a regular curve to the snout. Abdomen, between the ventrals and anal, trenchant. Scales rounded, moderately large. The radical margin produced in the middle, with 12 – 14 radiating striæ, which are distant in the centre, and crowded on the sides; exposed surface with diverging striæ. Lateral line may be traced from the upper end of the branchial aperture, over the opercle, to the superior portion of the orbits, forming rather a prominent ridge. This line is rather irregular in its course, until a short distance before the dorsal fin, when it is deflected, and becomes concurrent with the dorsal outline. Head compressed, scaleless. Opercle with a notch behind. Eyes 0·4 in diameter. Nostrils double, near the end of the snout; the upper largest. Mouth large; under jaw shutting within the upper. Teeth in a single series on the upper jaw; in several below. The sides and tips of the tongue armed with long acute recurved teeth.

The dorsal fin originates at a point equidistant between the tip of the snout and extremity of the tail: the first four, simple, short, and successively longer; the fifth, sixth and seventh, longest, thence gradually diminishing with a slight variation to the last, which is rather longer than the three preceding. Pectorals long and pointed, lying in a horizontal groove or cavity; the first ray simple, the second longest. Ventral small, with an obtusely pointed accessory scale; its tips do not reach the vent. Anal fin with thirty rays. It arises under the fifth dorsal ray; the first four rays very short, and successively longer; the seventh and eighth

longest, thence diminishing with a slight emargination to the last. It terminates about half its length from the base of the caudal, and there is a series of scales running close along the whole base of this fin. Caudal forked.

Color. Uniform metallic silvery, with a slightly darker shade beneath; bluish above. Pupils black; irides silvery. Fins light colored.

Length, 7·0. Depth, 1·5.
Fin rays, D. 15; P. 14; V. 7; A. 30; C. 19 $\frac{1}{4}$.

Lesueur, to whom we are indebted for the first notice of this species and its congener, seemed to be doubtful whether they were distinct. His opportunities were restricted, and he saw but two specimens. The two species are now well established. The figure of this species by Lesueur makes the dorsal deeply emarginated, and its base elevated and scaly.

This species is common in Lake Erie. At Buffalo and Barcelona, it is called *Moon-eye*, *Shiner*, and *Lake Herring*.

(*EXTRA-LIMITAL.*)

H. chrysopsis. (RICHARDSON, F. B. A. Vol. 3, p. 222, pl. 94.) With eleven dorsal and thirty-four anal rays. Length 16 inches. *Northern Regions.*

GENUS ELOPS. *Linneus.*

Jaws formed like those of the Herrings. Body cylindrical. The gill membrane with thirty or more rays. A flat spine on the upper and under edges of the caudal fin.

THE SAURY.

ELOPS SAURUS.

PLATE XLI. FIG. 131. — (STATE COLLECTION.)

Elops saurus. LINNEUS, Systema Nat. Ed. 12, p. 518.
Smooth Elops, Elops inormis. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 445.

Characteristics. Ventrals under the anterior part of the dorsal.

Description. Body elongated, cylindrical, compressed towards the tail. Dorsal outline gently arched before the dorsal fin, descending with a slope to the extremity of the upper jaw. Scales moderate, orbicular, caducous, membranous on their free margins, with faint concentric striæ; radical surface with from eight to ten radiating folds, and festooned on the margin (see figure). Lateral line formed by a series of tubular scales, arising above the upper angle of the branchial aperture, and descending by a gentle concave sweep to the tail. Length of the head to the total length as one to six nearly; flattened above with a broad distinct and deep furrow between the eyes. Orbits large, 0·5 in diameter. Nostrils double, contiguous; the

posterior largest. Upper jaw broad and rounded, entire and longer than the lower, which is received into it. An elongated bony process arising from the symphisis of the chin, and extending backwards 0·8 between the limbs of the lower jaw. Minute card-like teeth in many series on the labials, maxillaries, tongue and palatines.

The dorsal fin arises nearly midway between the end of the snout and the fork of the tail, its longest anterior ray equal to the length of its base; first ray short, the three following successively shorter, the fifth and sixth longest and subequal, thence gradually decreasing to the sixteenth ray subequal to the twenty-first inclusive, the last three gradually increasing in length; the margin is hence deeply excavated behind, and gives a subtriangular shape to this fin; its base is covered on each side, for some distance up, with a thick membrane. Pectorals broad, connected to its long pointed axillary scale by a membrane. Ventrals broad, triangular, distant; its origin is slightly in advance of the commencement of the dorsal fin, and it is equidistant between the pectoral and anal; its axillary plate is longer than the posterior rays; the first ray short and subspinous, the second long and simple. Anal deeply concave on its margin, with the same thickened membrane along its base, which we have noticed on the dorsal; the first ray exceedingly minute; the second, third and fourth successively longer; twelfth, thirteenth and fourteenth rays shorter than those which follow. Caudal widely forked; its tips as long as the head, with six accessory rays on each side, the first somewhat produced and flattened on the upper and under edges of the tail. To me this spine appears to be nothing more than an enlarged accessory ray.

Color. Body bright silvery, with a greenish tinge along the back. Pupils black; irides golden. Summit of the head bronzed. Opercles with golden metallic tints. All the fins more or less punctate with black. Dorsal and caudal light olive-brown. Inferior fins tinged with yellow.

Length, 11·5; of the head, 2·4.
Fin rays, D. 24; P. 15; V. 14; A. 17; C. 20 $\frac{6}{6}$.

I have compared this specimen with a very slight notice of an *Elops* on our coast by Dr. Mitchill, and refer them both to the same species.

The fish described above, was taken in a net in the harbor of New-York, in the autumn. It appeared to be little known to the fishermen, who spoke of having seen it before, and called it the *Round Herring*. Dr. Mitchill's specimen was twenty-two inches long. I find an *Elops* (not named) among the drawings of the fishes of Carolina by my friend Dr. Holbrook, and suppose it to be a different species.

The Saury is a southern species, and the coast of New-York is probably the limit of its extreme northern range.

(*EXTRA-LIMITAL.*)

Genus BUTIRINUS, *Commerson*. Tongue, vomer and palatines paved with rounded teeth, closely crowded together. Body elongated; mouth small, with even teeth in the jaws. Snout prominent. Branchial rays twelve.

B. vulpes. (CATESBY.) 2.1.2.

GENUS AMIA. *Linneus.*

Small paved teeth behind the acute conical ones. Head flattened, naked, with conspicuous sutures. Twelve flat gill-rays. A large long buckler between the branches of the lower jaw. Dorsal long. Anal short. Air-bladder cellular, like the lungs of reptiles.

THE WESTERN MUD-FISH.

AMIA OCCIDENTALIS.

PLATE XXXIX. FIG. 125, AND OUTLINE OF THE HEAD.—(CABINET OF THE LYCEUM.)

Characteristics. Dark brown; elongated. Lateral line tubular. Tail unspotted. Length two feet.

Description. Body cylindrical, elongated. Scales large, thin and membranous, with impressed concentric striæ; oblong, and with their radical and free margins rounded; on the back, the radical margins bifid. Lateral line distinct, tubular, arising from the upper angle of the opercle; thence descending by a gentle curve to the middle of the body, under the anterior portion of the dorsal fin; thence straight to the tail. Head broad, flattened above. Depth one-fifth of its length. Opercles bony, scaleless, corrugated. Eyes moderate, longitudinally oblong. Nostrils single, somewhat above the plane of the upper orbit, and nearer the eye than the end of the jaw. Jaws broad and rounded; the lower slightly advanced. Series of conic, acute, incurved teeth on the jaws and palatines; those on the sides of the upper jaw small, subequal; in front, longer; and behind these last, a large group of smaller ones closely crowded: the outer row in the lower jaw very robust, and much incurved. Four or five irregular series of short and smaller ones behind.

The dorsal fin originates ten inches behind the tip of the upper jaw, and, with its forty-six rays, reaches to within an inch of the base of the caudal fin. The first two or three rays of this fin short; the remaining rays subequal, but from the thirtieth to the fortieth, rather more elevated. Pectorals beneath the angle of the humeral bone, with seventeen rays, of which the first and second are shorter than the third. Ventrals long and narrow, with one short spinous and eight articulated rays; the longest ray 2·6, and placed under the twelfth ray of the dorsal fin. Anal high and narrow, with eleven rays, the anterior rays becoming gradually longer to the sixth. Caudal fin rounded, with eighteen broad and flat complete rays; the accessory rays are four above and six beneath, giving an irregular configuration to that fin. Small scales ascend some distance up the membrane.

Color. Of this I can say nothing, as I had only a dried specimen. It appears, however, to have been of a uniform dark brown.

Length, 28·0; of the head, 5·5.
Fin rays, D. 46; P. 17; V. 9; A. 11; C. 19 $\frac{4}{8}$.

My first personal knowledge of this species was derived from the specimen described above, which was sent to the Lyceum many years since by Mr. H. Schoolcraft. It was labelled "River St. Mary, Michigan Territory," and called "*Shigwumaig* in the Ojibway (Chippeway) dialect."

The only species hitherto described, *A. calva*, is from the rivers of Carolina emptying into the Atlantic. This species is found in Lakes Erie and Ontario, but I have not met with it.*

Under the head of *A. calva*, Dr. Kirtland states that "the *Dog-fish* is found in Lake Erie, "where it is frequently called '*The Lake Lawyer*.' It is distinguished by its ferocious looks "and voracious habits, (unde nomen?) The flesh is rank, tough, and not eatable. To the "anglers it is a troublesome nuisance, by taking their bait, and often breaking their hooks "and lines, which it can readily do by means of its large teeth and long jaws. Linneus de- "scribed a species of this genus as inhabiting the waters of Carolina. His characters agree "essentially with those of this lake fish, so far as I have compared them, except in the rela- "tive size of the pectoral and ventral fins; still I believe they are specifically identical."

Dr. Richardson furnishes us with a short notice of the "*Amia ocellicauda*," from Lake Huron, which may possibly be the *occidentalis* above described: "*Poisson de marais*. Back "and sides dark; belly and fins dark green. Head short, flattened at top and on the sides; "eyes small; jaws even; mouth capacious; tongue obtuse. Two short cirri on the upper "lip, the lower notched. One row of sharp longer teeth on the margin of the jaws, more "interiorly shorter clustered ones; two patches of teeth on the upper part of the gullet. "Pectorals near the throat; ventrals about the middle of the fish; one anal. One dorsal ex- "tending from four inches behind the neck to the tail, which is oblong and round, with an "irregular round spot of the size of a shilling, bordered with scarlet at the base of the seven "upper caudal rays. Scales large, semicircular and membranaceous exteriorly; square "where inserted into the skin. The intestines make three longitudinal turns in the abdomen. "Br. 8; D. 48; P. 17; V. 7; A. 9; C. 22." The dimensions of the specimen are not given.

(*EXTRA-LIMITAL.*)

A. calva. (Encyc. Method. pl. 99, fig. 408.) Tail with a black spot. Ventrals in the middle of the body. Pectorals not larger than the ventrals. D. 42. Length 8 – 10 inches. *Carolina.*

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* From various but imperfect reports, I have reason to believe that this species (*A. calva*) is also found in Pennsylvania." (SCHŒPFF, *Beobachtungen U. S. W.* Vol. 8, p. 174.) Schœpff doubtless alludes to the *occidentalis*.

FAMILY SAURIDÆ.

Body covered with scales of a stony hardness, which are extended into imbricated spines upon the first rays of all the fins. In some genera, dorsal finlets, each supported by a strong spine.

Obs. The fishes composing this group are so obviously distinct from all others of the family Clupidæ, with which they are arranged, that I have been in a measure compelled to treat of them separately. Their situation even among the soft-rayed fishes scarcely appears to be natural. To avoid the introduction of a new name, I make use of that already employed by Agassiz, and which also comprises the *Polypterus* of the Nile. I have not had an opportunity of referring to his description, and have framed the characters with reference both to the American and Egyptian genera. To this family may be referred many of the American fossil genera of fishes, which are included by Agassiz under the name of *Ganoidei*.

GENUS LEPISOSTEUS. *Lacépède.*

Snout formed by the union of the intermaxillaries, maxillaries and palatines, with the vomer and ethmoid, and much elongated. Jaws slightly unequal; both furnished over their whole internal surface with rasp-like teeth, and a row of long and pointed teeth along their edges. Dorsal and anal opposite and far back. Air-bladder cellular, as in Amia.

Obs. This species is peculiar to the rivers and lakes of America. When more thoroughly investigated, it will doubtless admit of subdivisions; but it will be requisite to make such divisions after an attentive study of the characters on the fishes themselves, and not (as has been done) from an inspection of drawings, which were made by persons not even versed in the department of Ichthyology.

THE BUFFALO BONY PIKE.

Lepisosteus bison.

PLATE XLIII. FIG. 139.

Esox osseus, Bony-scaled Pike. Mitchill, Trans. Lit. and Phil. Soc. Vol. 1, p. 444.
Bony-scaled Pike, E. osseus. Id. Am. Month. Mag. Vol. 2, p. 321.

Characteristics. Scales smooth. With narrow elongated jaws, and a broad dusky band on the side. Breadth of the upper jaw at the rictus, to its length, as one to six. Length one to three feet.

Description. Body elongated, cylindrical, compressed towards the tail. Scales arranged in oblique series, of which there are sixty-four from the branchial aperture to the tail. The scales are smooth, thick, rhomboidal, terminating on the caudal fin in an oblique line, which

is directed from above, forwards. The scales are loosely imbricated posteriorly, but firmly attached to each other by their upper and lower margins. In the dried specimens, they are of stony hardness; but in the recent fish, may be cut with a knife. Under the lens, they appear to be minutely spinous on their outer margins. This, however, only appears in the cabinet specimen, and may be owing to the desiccation of the mucus on the surface. The scales become elongated into bifid spines, which are imbricated over the external rays of the caudal and the first rays of the remaining fins. The lateral line commences at the upper angle of the opercle, gradually descending until it reaches the ventrals, and thence straight; it runs nearest the dorsal outline. Head square, rounded above, elongated. Eyes large, slightly oval, placed just behind the angle of the jaws; diameter of the orbits, 0.25. Opercles smooth, narrow, elongated, with a rounded margin, and furnished with a broad cellular membrane. Branchial rays three. Jaws elongated; the upper somewhat rounded above, with a longitudinal furrow, and enlarged and rounded at the tip, extending 0·3 beyond the lower jaw. Nostrils double; the posterior rounded, vertical; the anterior subterminal, and placed laterally on the margin of the enlarged part of the upper jaw. Both jaws armed with a series of very acute conical distant teeth on the outer edge, and another series of minute contiguous teeth within; on the enlarged end of the upper jaw externally, is a row of rather larger teeth, which, when the jaws are closed, shuts over the extremity of the lower jaw.

The dorsal fin near the tail, pointed, longer than high, and when reclined back, extends beyond the lower line of the base of the tail; its first ray is covered with four bifid imbricated spines; the third ray longest, the others successively shorter. The pectorals placed low down, slightly pointed; the third and fourth longest, subequal. Ventrals equidistant between the pectorals and anal, 1·3 long, acute, and composed of seven rays, of which the first is longest. Anal beneath the dorsal, with a somewhat wider base. Caudal rounded, with an oblique base; the fourth ray longest.

Color. Soiled yellowish; darker above. A broad longitudinal band of dusky brown extends from the opercles of the tail just beneath the lateral lines.

Length, 13·0; of the head and jaws, 4·0.
Fin rays, D. 8; P. 14; V. 7; A. 10; C. 14.

This fish, which frequently attains a larger size, was obtained at Buffalo, Lake Erie, where it is called the *Bony Pike*, *Alligator* and *Alligator Gar*. It occurs in many of the small lakes of the Western district, and has been taken at Ogdensburgh three feet long. It is frequently known under the name of *Buffalo-fish*, which suggested its specific name. From a communication which I received from Mr. Z. Thomson of Burlington, Vermont, I have reason to believe that this species exists in Lake Champlain. He speaks of it as being ten inches long, and as distinctly striped as in the *Coluber sirtalis*. I cannot suppose the above described species to be cofounded with *L. rostratus*, Cuvier (*huronensis*, Richardson), and certainly not with the following.

THE FLAT-NOSED BONY PIKE.

LEPISOSTEUS PLATYRHINCUS.

PLATE XLIII. FIG. 137. — (CABINET OF THE LYCEUM.)

Characteristics. Jaws broad, elongated. Breadth of the upper jaw at the rictus, to its length, as one to three. Scales smooth; dorsal series subcordate. Length 2 feet.

Description. Body cylindrical, subfusiform, with smooth siliceous rhomboidal scales, arranged in fifty-two oblique series; the scales on the sides convex on their posterior and inferior margins, rather acutely pointed behind (see figure 2), the radical portion terminating in a sort of pedicel; the scales at the basis of all the fins elongated, acute. The lateral line descending from the upper angle of the opercle, thence straight; its course indicated by short vertical slits on each scale. Head four-sided, flattened above; the opercular bones forming a right angle beneath. The upper surface of the head and mandibles (see figure 1) broad, flattened, tubercular, with irregularly elevated and parallel lines and dots radiating in all directions. Jaws scarcely as long as the head, measured from the rictus to the posterior margin of the opercles. Upper jaw longest, with two sinuous furrows above ending in the posterior nares; a transverse furrow from the anterior nares to its opposite; from the centre of this line, a short furrow proceeds forward to the end of the jaw. Around the end of the jaw, a series of open pores. This jaw is enlarged at the extremity as in the preceding species, and is 0·4 longer than the inferior. Teeth in both jaws, long, acute, distant, with smaller intermediate ones. In the palatine series, I observed a tooth of so remarkable a configuration, that I deemed it worthy of especial note (see figure 3). It was loosely attached, and may possibly be extraneous. The figure represents it of the natural size.

Dorsal fin with seven aculeated rays, and eight bifid scales over its first ray. It arises opposite the penultimate ray of the anal, (this is wrongly given by the draftsman,) which it resembles in shape and size. Pectorals long and narrow. Ventrals midway between the pectorals and anal, with six rays and seven bifid scales. Anal with nine bifid scales. Caudal obliquely rounded, with fourteen or fifteen bifid scales on each external ray.

Color. Greyish above, separated by the lateral line from the soiled white or yellowish beneath.

Length, 25·0; of head and jaws, 4·4.
Fin rays, D. 7; P. 10; V. 6; A. 8; C. 12.

This species is found in Florida and the western rivers, and will probably be found in some of their sources within this State.

We have another species within this State, which, however, I have not seen. It may be the *longirostris* hereafter mentioned.

(*EXTRA-LIMITAL.*)

L. longirostris. (Cuvier, Richardson, F. B. A. Vol. 3, p. 237.) A row of close small acute teeth externally; another larger, distant, and conical; and within these another, forming a band of fine velvet-like teeth in a single series in front. Scales rhombic, the lower edge arched; vertebral series subcordate. D. 7; P. 15; V. 6; A. 8; C. 13. Two to three feet. *Lake Huron.*

ORDER III. JUGULAR.

Ventrals under the pectorals, and the pelvis is immediately attached to the bones of the shoulder.

FAMILY GADIDÆ.

Body elongated, little compressed, covered with soft moderate scales. All their fins soft. Jaws and front of the vomer armed with pointed irregular teeth, forming a sort of rasp. Eyes placed one on each side of the head. Ventrals separate, jugular. Almost all with two or three fins on the back, and one or two behind the vent. Air-bladder large.

Obs. This family contains at present about sixty species, and is one of the most important to man in the whole class of Fishes.

GENUS MORRHUA. *Cuvier.*

Dorsal fins three. Ventrals pointed. Two anal fins. Seven branchial rays. A barbel at the end of the lower jaw.

THE AMERICAN COD.

Morrhua americana.

PLATE XLIV. FIG. 140.

Gadus callarias, Torsh, or *Common Cod* or *Rock Cod of New-York.* Mitchill, Report in part, p. 5.
The Common Cod of New-York, G. id. Id. Trans. Lit. and Phil. Soc. New-York, Vol. 1, p. 367.
Morrhua americana, The American Cod. Storer, Mass. Report, p. 120.

Characteristics. Ash-colored, with reddish or yellowish spots. Second dorsal and first anal of twenty-two rays. Length one to three feet.

Description. Body largest and deepest anterior to the dorsal fin. Scales small and adherent. The lateral line arises from above the branchial aperture, and gradually descends by a broad

curve until it reaches the anterior portion of the middle dorsal fin, when it goes off straight; distinct throughout its whole course, and somewhat wider behind. A single barbel or cirrus at the point of the lower jaw, an inch long, and enlarged at the base. Head sloping, in a slightly arched line; its length to the total length, as one to four and a half. Eyes large and distant. Nostrils double; posterior lower and largest. Upper jaw longest, both armed with teeth; in the upper jaw, four rows in front, gradually reduced to two in the posterior part of the jaw. Lower jaw with a single row, which is small in front, larger in the posterior part of the jaw.

The first dorsal fin commences slightly behind the base of the pectorals, longer than high, rounded on its margin; its first ray simple, and shorter than the second; the third longest, from whence they become successively shorter. The second arises directly behind it, with its rays gradually diminishing to the last; the third arises directly behind it, is of nearly twice its length, with a straight sloping margin; the third arises immediately behind the second, in advance of the origin of the second anal, and is longer than the first fin. Pectoral fins broad and rounded, of twenty and twenty-one rays. Ventrals in advance of the pectorals; the second ray longest, filiform; this and the first ray often occur free. The first anal commences slightly behind the origin of the second dorsal, and is slightly shorter than that fin; the second anal, subtriangular. Caudal nearly even, slightly rounded.

Color. This varies so much in different individuals, as to have given rise to the belief that there is more than one species. The most usual arrangement of the markings is exhibited in the plate. In this, the back is of a light olive-green, (becoming pale ash in the dead specimens,) covered with numerous reddish or yellowish spots to a short distance below the lateral line. Cheeks, abdomen and lower fins whitish, minutely punctate with black. Head greenish olive above; irides silvery. Lateral line opaque white throughout its whole extent. Pectorals and dorsals light green, usually punctate with black. Caudal of a darker green. The more usual varieties are, 1, with a greenish brown hue and inconspicuous spots, the *arenosus* or *Shoal Cod* of Dr. Mitchill; 2, of a smaller size, and with a reddish hue occasionally bright red, the *rupestris* or *Rock Cod* of the same author; 3, a more rare variety noticed by Dr. Storer, of a bright lemon-yellow.

Length, 24·0.
Fin rays, D. 15.22.19; P. 19; V. 6; A. 22.19; C. 40.

This species has been very properly separated by Dr. Storer from the *G. callarias*, and even from the *G. vulgaris*, or *Common Cod* of Newfoundland, with which it had been confounded. It occasionally attains an enormous size. Specimens weighing seventy and eighty pounds are sometimes taken. Dr. Storer speaks of a well authenticated instance of one which reached the enormous size of one hundred and seven pounds. It occurs along our coast during the whole year, going off into deeper water in the spring.

The capture of the Bank Cod has not, as far as I am aware, excited much interest in this State; but some idea of its importance in neighboring States may be gathered from the fol-

lowing facts: In the year 1836, five hundred and sixty-one vessels were employed from ten towns along the coast of Massachusetts, having crews amounting to three thousand eight hundred and sixteen men. In the following season, 510,554 quintals were taken, producing the sum of $1,569,517. At the rate of thirty-five hundred fish to one hundred quintals, which is the usual average, some idea may be formed of the number annually taken. From the Register's office, Tonnage Bureau, we learn that in 1840, the tonnage of all the vessels engaged in the cod fisheries amounted to 76,025 tons, which, at the usual rate of six men to twenty-five tons, would give us a total of more than eighteen thousand men and boys employed in the fishing business alone.*

The taking of the American Cod is carried on in small open boats and schooners, along the northern coast, and affords occupation to thousands, supplying our markets at all seasons with fresh fish, which commonly sells at four cents per pound. From the liver not only of this species, but of others of the same family, as well as from sharks and mackerel, an oil is obtained, by exposing it to putrefaction in the sun, which is highly prized by the leather-dressers, and sells for fifteen dollars per barrel.

Several species of this family have been successfully reared (we can scarcely say domesticated) by a person in the neighborhood of Edinburgh. He has a salt-water pond about thirty feet in width by two hundred in length, communicating with the sea, and allowing a free passage to the tide through an iron grating. They are fed with smaller fishes, and with the intestines of sheep, which the cod is observed to devour with great avidity, and to fatten in a short space of time.

The American cod is exceedingly voracious. It attacks indiscriminately every thing in its way, devouring smaller fish, crustacea and marine shell-fish. Its stomach is in fact the great repository from which has lately been obtained so many rare and undescribed species of shells, inhabiting deep water, and which are unattainable by any other means.

Its geographical range appears to be from the coast of New-York, northwardly.

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* At the same Bureau, we were furnished with the following table of tonnage for 1840:

	TONS.
Vessels in the Cod fishery,	76,025.65
Ditto in the Mackerel fishery,	28,267.19
Ditto in the Whale fishery,	136,926.64
Total,	251,219.48

THE POWER COD.

MORRHUA MINUTA.

PLATE XLIV. FIG. 141.

Gadus minutus. LINNEUS.
M. minuta. YARREL, British Fishes, Vol. 2, p. 161, plate.
The Poor or *Power Cod, Morrhua minuta.* STORER, Zool. Massachusetts, p. 127.

Charactaristics. Small. Nose blunt. First dorsal scarcely higher than the second, which is emarginate. Origin of the first dorsal under the commencement of the second dorsal. Caudal emarginate. Length 4 to 8 inches.

Description. Body cylindrical, fusiform. Upper jaw longest; both armed with numerous small teeth. The barbel from the symphisis of the chin, 0·2 long. Lateral line curved above the pectoral; and under the anterior portion of the middle dorsal, goes off straight. A series of mucous pores from the end of the snout to beneath the eyes. Scales very minute.

The first dorsal triangular, and composed of twelve rays, of which the first is longest. Second dorsal above the first anal; the twelfth, thirteenth and fourteenth rays sensibly shorter, making an excavated margin; the third dorsal longer than high. Pectorals pointed, 1·0 long. Ventrals beneath the pectorals, with the long second ray free at the tip. First anal commences under the origin of the second dorsal; the second anal is opposed to, and contains the same number of rays with, the third dorsal. Caudal broadly emarginate.

Color. Brownish yellow above; abdomen soiled white, with numerous minute points.

Length, 8·0.
Fin rays, D. 12.19.17; P. 17; V. 6; A. 22.17; C. 20.

This is a rare species on our coast. I only know it through the description of Dr. Storer, although I think I saw it some years since in the market. At that time, I supposed it might be the *M. pruinosa*, var. *fusca*, of Dr. Mitchill; but I have now little doubt but that it was the species just described.

THE TOM-COD.

MORRHUA PRUINOSA.

PLATE XLIV. FIG. 142. — (STATE COLLECTION.)

Gadus ——, *Tom-cod at New-York.* SCHŒPFF, Beobachtungen u. s. w. Vol. 8, p. 140.
Frost Cod, and *Frost-fish.* PENNANT, Arct. Zoology, Supplement, p. 114.
Gadus pruinosus, *Tom-cod* or *Frost-fish.* MITCHILL, Report in part, &c. p. 4.
Tom-cod, *Gadus tomcodus.* ID. Trans. Lit. and Phil. Soc. New-York, Vol. 1, p. 368.
Gadus tomcodus, *Tom-cod.* STORER, Fishes of Massachusetts, p. 126.

Characteristics. Head small, and flattened above. Abdomen prominent. Tail long and slender. Cheeks lustrous. Second ventral ray filamentous. Length 4 to 12 inches.

Description. Shape oblong fusiform; abdomen prominent. Scales small, orbicular, with concentric striæ. Lateral line tubular, slightly curved until it reaches beneath the centre of the middle dorsal, when it goes off straight. Head depressed, flattened above; the facial line sloping. Snout rounded, obtuse, prominent. A small barbel at the symphisis of the lower jaw. Eyes small, 0·7 apart. Nostrils double; the anterior largest. Opercle pointed. Tongue white, distinct and smooth. Minute sharp teeth in the jaws and vomer, and in rounded patches on the pharyngeals. Stomach angular, with numerous cæca; filled with remains of small decapodal crustacea. The air-bladder large, cylindrical, extending from the posterior extremity of the first anal fin to the gills, where they have two vermicular appendages; internally silvery, but deep black above.

The first dorsal fin begins over the middle of the pectorals, triangular; the second slightly longer than the third; the first and third higher than the second dorsal. Pectorals rounded, subacute. Ventrals with the second ray filamentous, and 1·3 long; both the first and second with free tips. The first anal longest, and distinctly separated from the second, which is opposite the last dorsal. The caudal rounded.

Color. Dark olivaceous green above, with darker irregular streaks and blotches, giving a mottled appearance. Irides yellowish. Beneath silvery white; and in old females, this part becomes golden yellow. Scales minutely punctate with brown; immaculate beneath. Dorsals and caudal dark brown, tinged with reddish. Pectorals reddish brown. Ventrals buff-orange. Anals light brown, tinged with red or yellow. The colors in scarcely two individuals are alike. Dr. Mitchill has noticed five varieties, but the number might be still farther increased.

Length, 6·0.
Fin rays, D. 12.20.18; P. 17; V. 6; A. 20.18; C. 37.

The Tom-cod is found on our coast during the whole year; but in the autumn after the first frost, (hence its name of *Frost-fish*,) and the early part of winter, it becomes very abundant. They are a savory fish, and are caught in large quantities with the greatest ease. I

have known them to be taken out of the water along the shores of Long Island, in great numbers, with a common garden hoe. They ascend rivers even into fresh water. Dr. Eights informs me that they appear at Albany in abundance, at intervals of six and eight years.

The specific name (*tomcodus*) proposed by my estimable and amiable friend, the late Dr. MITCHILL, has been frequently made the subject of animadversion. Although not unobjectionable, it ranks with *cattus*, *rattus*, *sprattus*, *kangurus*, *terrapene*, *johnnius*, *lumpus*, and a host of others which have been adopted without comment. It gives me pleasure, however, to be enabled to satisfy the tastes of the most fastidious, by restoring the original name of the first describer. The name *luscus* of Peck, in Belknap's History of New-Hampshire (Vol. 3, p. 130), I can only conjecture to have been intended for this species.

The range of this species appears to be from the coast of New-York northwardly.

THE HADDOCK.

MORRHUA ÆGLEFINUS.

PLATE XLIII. FIG. 138.—(STATE COLLECTION.)

Gadus æglefinus. LINNEUS, Syst. Nat. 12 ed. p. 435.
G. id. MITCHILL, Trans. Lit. and Phil. Soc. Vol. I, p. 370.
Morrhua æglefinus. CUVIER, R. A.
M. id. STORER, Massachusetts Report, p. 124.

Characteristics. Lateral line jet black, occasionally interrupted. Caudal emarginate; first dorsal elevated. Length one to two feet.

Description. Body robust, large in front, tapering behind. Length of the head to the total length as one to four. Height of the body at the pectorals, one inch less than the length of the head. Scales small, elliptical, feebly radiate, striate. Lateral line high up, and irregularly concurrent with the dorsal outline; it is not unfrequently interrupted with occasional branches or offsets from the ordinary course. Head large, slightly carinated on the nape; broad, and slightly convex between the eyes. Snout conical, prominent. Eyes large, and placed high up near the facial outline. Nostrils double, longitudinally oval, contiguous; the upper slightly anterior, somewhat smaller, and with a valvular membrane. Lips thick and fleshy. The lower jaw shortest, with a single row of short minute teeth; the upper jaw with a band of very short minute teeth. A single, short and very small barbel under the chin.

The first dorsal triangular, the third ray longest; higher than long, and higher than the other dorsal fins; its origin over the base of the pectorals. The second dorsal longest, arising slightly anterior to a point vertical to the vent; the third triangular, and almost continuous with the second. Pectorals large; the tips extending to a point below the third ray of the second dorsal. The first anal longest; the second arises under the third ray of the last dorsal. Caudal fin with its margin concave.

Color. Above the lateral line, blackish brown; below silvery grey; the line itself jet black. One or more large, dark, vertically oblong blotches across the lateral line. Pupils black;

irides bluish mixed with reddish. Dorsal and caudal fins bluish; anals dusky, lighter along their bases; pectorals bluish, occasionally the lower half light-colored.

Length, 22·0. Head, 5·5.
D. 15.22.20; P. 21; V. 6; A. 25.21; C. 34 $\frac{8}{8}$.

The Haddock is nearly as common in our markets as the Cod, but is an inferior fish as an article of food. It is, in fact, during the summer, more abundant than the cod. Dr. Storer states, that on the coast of Massachusetts, 'they are more abundant than the cod, are frequently sold for one or two cents apiece, and often strewed on the ground for manure.

(*EXTRA-LIMITAL.*)

M. vulgaris, the Bank Cod. Abdomen white. Lower half of the lateral line white. Second dorsal and first anal with nineteen rays.

GENUS MERLUCIUS. *Cuvier.*

The head flattened; body elongated. Two dorsal fins. No barbels on the chin. The single anal fin very long.

THE AMERICAN HAKE.

MERLUCIUS ALBIDUS.

PLATE XLVI. FIG. 148.

Le Merlu. DUHAMEL, Pesches, part 2, Cap. 7, pl. 24.
Hake. PENNANT, Arctic Zoology, Vol. 3, p. 115.
Stomodon bilinearis? MITCHILL, Report in part, &c. p. 7.
The New-York Whiting, Gadus albidus. MITCHILL, Ac. Nat. Sc. Vol. 1, p. 409.
Gadus merlucius, Hake. ID. Lit and Phil. Soc. Vol. 1, p. 371.
Merlucius vulgaris, Hake. STORER, Fishes of Massachusetts, p. 132.

Characteristics. Reddish brown above. Long, acute palatine teeth. Lower jaw longest. Length one to two feet.

Description. Body oblong, cylindrical, subcompressed, and covered with a viscid mucus. Scales loosely attached, and partially concealed by a loose membrane. On the flanks, the scales are ovate, the concealed portion being narrowest; near the upper angle of the opercle, the scales have the same shape, but are much larger; on the head, they are very small, orbicular, and concentrically striate on their surface. Lateral line arising above the branchial aperture, near the nape, very distinct, straight, nearly concurrent with the line of the back, and composed of short interrupted tubes. Head large, broad, depressed, and in desiccated specimens, presents strong bony sutures. In the recent fish, a few of these may be observed. Thus, over the eye is an elevated crest, taking a sinuous course backward to the upper part

of the branchial aperture; another commencing near and above the origin of the preceding, runs obliquely towards the central part of the summit of the head, joining its opposite from the other side, and forming with it an inverted V; from the apex of this figure, there is another central elevated line running backward over the nape. Eyes large and prominent, nearer the end of the snout than to the posterior margin of the opercles, and near the facial outline; diameter of the orbits, 0·8. Nostrils double; the posterior largest, and separated from the anterior by a narrow slip of membrane. Mouth wide, with fleshy lips. Lower jaw longest. Membrane of the opercle large and pointed. Seven flat branchial rays; the membrane of the left side overlapping that of the opposite. Tongue large and distinct.

Both jaws armed with ill defined series of very sharp recurved teeth, some of which are 0·2 in length, and resemble the fangs of serpents; these long fang-like teeth are distant, the interval being filled up with smaller teeth to supply their places. In the central portion of the upper jaw, is an interval destitute of teeth. On the palatines, on each side, there is a series of twelve or fifteen teeth of the same shape, and nearly as prominent as those in the jaws. The outer row of branchial arches with long pectinated processes; the others with series of tubercles, composed of sharp card-like teeth. The lower pharyngeals consist of two long triangular patches of sharp recurved teeth on each side; the two posterior are somewhat triangular, and placed side by side; above these are two others, sublinear, and extending transversely across the jaw.

The first dorsal subquadrate, with a delicate membrane connecting the rays; it commences 5·5 from the end of the snout, and its base two inches in extent. At an interval of 0·6, commences the second dorsal, which extends the whole length of the back nearly to the tail; at the thirteenth ray, we noticed a double ray followed by two others apparently naked; we say apparently, but in reality they were only denuded; the following ray was broken off, and a similar occurrence in other specimens has probably led some ichthyologists to place this species in another genus. I suppose the double ray and the isolated ones to have been purely accidental. All the rays of the dorsal are simple, and often terminate in a filament; from the sixteenth to the twenty-second ray, the fin is low, gradually increasing to the twenty-fourth, which, with one or two others, are 1·5 high, and thence gradually decrease to the termination. Pectorals long and slender, extending to the interval between the first and second dorsal, composed of simple slender rays. Ventrals broad, and placed before the pectorals. The vent at a point beneath the interval of the first and second dorsal. Anal of forty rays, subequal throughout the greatest portion of its extent, higher towards its termination; but a few of the last rays much shorter, and extending slightly beyond the termination of the dorsal. Caudal lunate, almost furcate, with minute ovate scales extending far up the rays.

The abdominal cavity coated with a black pigment. Liver of one large and broad lobe, extending beyond the vent. Stomach very muscular, cylindrical, and without cæcal appendages. Kidneys large; urinary bladder large, and opening externally by a distinct aperture posterior to the vent. Air-bladder ample, largest before, where it has two sac-like processes; it is supported throughout its whole extent by dilated membranous processes from the vertebræ.

Color. Reddish brown, with golden yellow tints towards the shoulders. Sides of the opercle silvery, with a pinkish lustre. Summit of the head dark brown; lower part of the body soiled white; lateral line brownish black. Tongue, surface of the branchial arches, fauces, and interior of the opercles, deep bluish black. Irides golden, mottled with brown. Dorsals light brown, the rays lighter. Caudal dark brown; remaining fins whitish, minutely punctate with brown.

Length, 19·0; of head, 5·0. Breadth and depth of ditto, 2·5. Depth of body, 2·5.
Fin rays, D. 11.39; P. 16; V. 7; A. 40; C. 17 $\frac{6}{6}$.

This is a rare fish in the waters of New-York, and when caught, is always associated with our common cod. It has hitherto been confounded with the *M. vulgaris* of Europe, from which we suppose it to be distinct by its radial formula, its long palatine teeth, its deeply concave caudal fin, and other particulars.

The specimen described above, was taken in November, off Sandy Hook. The fisherman from whom I procured it, called it the *Whiting*, and said that it was very rare. As Mitchill's little tract upon the New-York fishes is very scarce, I insert his description of a fish of which I have never yet met with, unless it be the Hake above described.

" *Stomodon bilinearis*. The name given to a hard-featured fish bought in the New-York " market, November 4, 1813. The length twenty-one inches. Mouth wide, and armed with " sharp teeth; double row in the upper jaw, single in the lower. Palate also armed with " teeth, as is the back of the tongue and throat, all very acute. Lower jaw rather longer " than the upper. Head bony, and covered with skin in such a manner as to indicate its " inequalities. Eyes large. Nostrils single. Lateral line dark and double; continued in " nearly a straight course from a groove above the eye to the middle of the tail, divided by a " very narrow bright stripe. Between the eyes, a remarkable depression, reaching, in a bifid " channel, the snout. Color of the back, a mottled dark grey; of the belly, a dirty white. " Rays, B. 7; D. 12 – 39; V. 4; P. 13; A. 39; C. 24."

The *Gadus albidus*, subsequently described in the Journal of the Academy cited above, is undoubtedly identical with the Hake, although some errors have crept into the author's statement. Thus, the accidental rupture of the membrane has led him to attribute three dorsals and two anals to this species.

The species of this genus appear to be limited in their geographic range. The European Hake is abundant on the west coast of Ireland, while on the east coast of Scotland it is exceedingly rare. On the coast of New-York it is very rare, while farther north it is very numerous. Smith, in his History of the Fishes of Massachusetts, states that the best are taken off Cape Cod, and sold under the name of *Stockfish*. When prepared for market, according to the same authority, they are called *Poor Johns*.

It is in little repute as an article of food, although well flavored when perfectly fresh, but soon becomes soft and tasteless.

GENUS LOTA. *Cuvier.*

Dorsal fins two. A single anal fin. Body much elongated. One or more barbels on the chin. Inhabiting fresh and salt water.

THE PLAIN BURBOT.

LOTA INORNATA.

PLATE XLV. FIG. 145. — (CABINET OF THE ALBANY INSTITUTE.)

Characteristics. Ventrals with filamentous tips; the first ray partly free. First and second dorsals subequal in height. Length one to two feet.

Description. Body cylindrical, tapering and compressed towards the tail. Scales small, rounded, deeply imbedded in the skin, and extending over the head and opercles. Lateral line runs nearly parallel with the dorsal outline, from which it is distant about an inch, and covered with minute scales. Head broad, depressed. Eyes lateral, placed near the summit of the head, two and a half diameters from the end of the snout, and six diameters from the margin of the opercle. Nostrils double; the first oval, the anterior, a single diameter of the orbit distant from the eye, with a short tube terminating on its external edge in an acute tip. Abdomen prominent, rotund. Lower jaw shorter than the upper, and furnished with a single barbel three-quarters of an inch long. Intermaxillary with a broad belt of equal incurved teeth; a similar belt on the vomer, palatines and pharyngeals. Tongue broad and smooth.

The first dorsal short, rhomboidal, commencing at a point distant from the eyes equal to the length of the anal fin; of the same height with the second, which is long, low and subequal throughout its whole extent. It commences half an inch behind the first, and in length is nearly equal to the space between the first ray of the anal and the commissure of the jaws; its rays are enveloped in a thick and tough membrane, in common with those of all the other fins. The pectorals rounded, and placed two inches and a half behind the eyes. Ventrals acute, placed very far forward; the second ray longest and filamentous, the first ray free for nearly half an inch. Anal fin subequal, terminating at a point under the sixty-sixth ray of the second dorsal, and commencing opposite the tenth ray. Anal quite rounded, and entirely surrounding the obtusely pointed tail; its rays beneath are three-quarters of an inch from the termination of the anal, and above at a less distance from the termination of the dorsal.

Color. Of this I am unable to state any thing, as it was preserved in spirits; it appeared to resemble that of the common cod, with a general reddish brown hue, pale bluish beneath. The dorsal appeared to have been margined with dusky. No appearance of spots or stripes whatsoever. The place of the right eye was entirely concealed by the common teguments; this, I presume must have been accidental.

Length, 29·0. Depth, 3·0.
Fin rays, D. 9.71; P. 19; V. 7; A. 63; C. 45.

The fresh-water species of this genus are usually called *Burbot* and *Eel-pout*, while the name of *Ling* is attached to those living in the ocean. The specimen which furnished the above description was captured in the Hudson river at Lansingburgh, and presented to the Albany Institute by Mr. Jacob C. Lansing. I suspect its original habitat is in Lake Champlain, and that it reaches the Hudson river through the canal. Mr. Z. Thompson informs me that he has observed a Burbot in that lake, which agrees neither with the *maculosa* nor *compressa* of Lesueur, and which in all probability is this species. It bears a general resemblance to the *Gadus compressus* of Lesueur; but from this it differs in size, and the comparative length of the dorsal and anal fins.

Nothing is known of its habits. The allied European species is said to resemble the eel in its habits, concealing itself under stones, and feeding chiefly at night. In Switzerland, it is much esteemed as an article of food.

THE SPOTTED BURBOT.

LOTA MACULOSA.

PLATE LII. FIG. 168.

Gadus lota. SCHŒPFF, loc. cit. Vol. 8, p. 141; PENN. Arct. Zool. Introduction, p. 191.
Gadus lacustris. Codfish of the Lakes. MITCHILL, Am. Monthly Magazine, Vol. 2, p. 244.
G. maculosus. LESUEUR, Ac. Sciences, Vol. 1, p. 83.
Le Molve tacheté. ID. Mem. Mus. Vol. 5, p. 159, pl. 16.
The Methy, Gadus (Lota) maculosus. RICHARDSON, Faun. Bor. Am. Vol. 3, p. 248.
Eel-pout, L. maculosa. KIRTLAND, Report on the Zoology of Ohio, p. 196.

Characteristics. Large, dark brown, with lighter spots. Anterior nostrils with a membranous filament. Length two feet.

Description. Body oblong, compressed, anguilliform. Head broad, depressed; jaws nearly equal. Scales minute, rounded and deeply imbedded; under the lens, concentrically striate. Lateral line in a furrow; arched slightly at its anterior part, thence going off straight. Eyes small, oval. Teeth in the jaws, small and recurved, distributed in bands; similar but smaller teeth on the vomer and anterior part of the palatines, also on the pharyngeals. Branchial rays seven. The first dorsal small, subtriangular; the first ray short. The second commences 0·3 behind the first; long, low, and coterminal with the anal. Pectorals long, pointed; its tips reaching nearly to the base of the first dorsal. Ventrals anterior to the pectorals, long, narrow, and ending in a long thin point. Anal long, subequal. Caudal rounded; its rays above nearly touching the second dorsal, and not quite so near the base of the anal.

Color. Deep chesnut brown, marbled with lighter spots; beneath lighter. Pupils black; irides white and golden. Ventrals white.

Length, 18·0.

Fin rays, D. 10 or 12, 70 or 74; P. 16; V. 6; A. 70; C. 45 to 50.

This fish was first described by Lesueur, from Lake Erie. It is very voracious, feeding on crayfish and the smaller fish. It is a poor article of food; even the dogs in the arctic regions refusing to touch it. The liver and roe are, however, considered great delicacies. It is known under the various local names of *La Loche, Methy, Dog-fish* and *Eel-pout*. According to Richardson, it is common in every river and lake from the great lakes to the frozen ocean. It occurs in several of the small lakes in the western district of this State.

THE COMPRESSED BURBOT.

LOTA COMPRESSA.

PLATE LXXVIII. FIGS. 244 and 245.

Gadus compressus. LESUEUR, Journ. Acad. Nat. Sc., Vol. 1, p. 84.
Lota compressa, The Eel-pout. STORER, Massachusetts Report, p. 134.

Characteristics. Body much compressed. Yellowish brown varied with darker spots; a row of dusky spots along the base of the second dorsal. Dorsal, anal and caudal connected. Length six to eight inches.

Description. Body much compressed, commencing at the tip of the pectorals, and becoming more so until the caudal fin appears like a membranous continuation of the body. Surface covered with minute scales, resembling cup-shaped depressions. Lateral line obvious, straight. Head compressed. Nostrils double. A minute barbel on the hinder margin of the anterior nostril. A single barbel, 0·25 in length, attached to the chin. Upper jaw longest; both armed with acute and minute teeth. The first dorsal placed the length of the head behind it; the second, arising 0·25 behind it, is continued to the tail. Pectorals 0·75 long. Ventrals small and pointed. Anal equal in length to the second dorsal. Caudal rounded.

Color. Yellowish brown varied with darker brown spots. Gill-covers and snout blackish brown. Abdomen whitish. The first dorsal lighter than the body, and varied with black. A row of dark colored spots along the base of the second dorsal, and its edges margined with black. The anal and caudal are marked in a similar manner.

Length, 6·0 – 8·0.

The only two specimens described, are from the Connecticut river and its tributaries. I know it only through the descriptions of Lesueur and Storer. Cuvier, in 1838, had designated a group of the Gadidæ under the name of *Molva* (afterwards suppressed), and it was probably this circumstance which induced Lesueur to mark his plate *Molva huntia*. *Brotula* has the dorsal, anal and caudal continuous, but the tail is pointed. Its history and description is yet incomplete.

GENUS MERLANGUS. *Cuvier.*

Three dorsals and two anals. No barbels to the chin.

THE NEW-YORK POLLACK.

MERLANGUS PURPUREUS.

PLATE XLV. FIG. 147.

The New-York Pollack, Gadus purpureus. MITCHILL, Lit. and Phil. Soc. N. Y. Vol. 1, p. 370.
Merlangus purpureus, The Pollack. STORER, Report on the Fishes of Massachusetts, p. 130.

Characteristics. Caudal fin deeply concave. The third dorsal fin of twenty rays. Lateral line black. Length eighteen inches to three feet.

Description. Body oblong, cylindrical, subcompressed. Scales small, with concentric and radiating striæ, and extending over the head and opercles; the exposed surface very small on the head, and resembling shagreen. Lateral line curved, but not concurrent with the dorsal outline. Eyes large; nearer the end of the snout than to the posterior edge of the opercle. Nostrils double, oval, contiguous, nearly vertical; the posterior largest. Mouth moderate; the lower jaw longest. A series of small acute teeth in each jaw. No free interval in the centre of the upper jaw. Asperities on the vomer; very minute teeth on the pharyngeals. The anterior branchial arch pectinated; the others tubercular.

The first dorsal subtriangular, longer than high, equidistant between the tip of the snout and the nineteenth ray of the second dorsal; its base covered with minute scales; the first four rays simple, the first very short, the others successively longer; the fifth and sixth longest, subequal; the remainder suddenly shorter. The second dorsal long and triangular, arising 0·4 behind the first; its first three rays simple, the first ray 0·7 long, the fourth and fifth longest, thence gradually diminishing to its termination a little anterior to the end of the first anal. At an interval of 0·6 comes the long third dorsal, terminating above the end of the second anal. The pectorals broad, extending to the tenth ray of the first dorsal. Ventrals feeble, before the pectorals; the first ray longest, and, with the second, filiform at the tips. The first anal fin long and low, commencing at a point equidistant between the point of the jaw and the end of the second anal; its first two rays short and simple; the seventh and eighth longest, subequal. The second anal subquadrate, with its first two rays short and simple. Caudal dilated by numerous accessory rays.

Liver with two long triquetrous lobes, enlarged in front, and almost embracing the gall-bladder. Intestines with six convolutions. Stomach an angular sac, with numerous minute cæca; it is corrugated internally, and filled with a yellow glairy fluid. Air-bladder eight inches long, cylindrical, and extending from near the pharynx to a point behind the end of the second dorsal, where it is supported by bony rings or processes of the vertebræ. Anteriorly

it ends abruptly in a small pit or depression, but I was unable to detect in this place any connexion outwardly. A small flat reddish gland on its interior surface.

Color. Dark olive-green above, paler on the sides; summit of the head olive brown. Irides silvery. Interior of the mouth dark colored. Tongue silvery in the middle, blackish on the sides; the roof of the mouth silvery and flesh-colored. Gill-covers silvery. Abdomen white.

Length, 18·0. Depth, 4·0.
Fin rays, D. 13.21.21; P. 20; V. 6; A. 25.20: C. 24 $\frac{8}{8}$.

This fish occurs in our markets occasionally during the winter. It is taken with the common cod, but it is by no means common on the coast of New-York. On the coast of Massachusetts, north of Cape Cod, in the spring and autumn, they are very numerous. I have seen a specimen weighing seventeen pounds, three feet two inches long; but the individual described above is of the average size.

THE COAL FISH.

MERLANGUS CARBONARIUS.

PLATE XLV. FIG. 144. — (STATE COLLECTION.)

Gadus carbonarius. LINNEUS, Syst. Nat. 12 Ed. p. 438.
Merlangus id. CUVIER, Règne Animal.
Gadus (Merlangus) carbonarius. RICHARDSON, F. B. Am. Vol. 3, p. 247.
Merlangus carbonarius, The Coal-fish. STORER, Massachusetts Report, p. 129.

Characteristics. Dark brown or deep black. The third dorsal of nineteen or twenty rays. Lower jaw slightly longest. Length one to three feet.

Description. Body fusiform, cylindrical, approaching the mackerel in shape; covered with a thick mucous coating, which at first conceals the scales. These are small, oblong, and of the shape represented in the plate; the exposed surface very small, and concentrically striate. The scales extend over the opercles, the head beyond the nostrils, the anterior part of all the dorsal fins, and high up on the caudal fin; on the summit of the head, they are very minute, oblong, and resemble those on some species of serpents. The lateral line straight, and descending obliquely through the tail; the fleshy portion of the tail elongated. Head tapering to the snout, flattened above. Eyes large, prominent, near the facial outline, and rather nearer the snout than to the posterior margin of the opercles. Nostrils double, contiguous; the anterior valvular. A series of mucous pores around the jaws. Lower jaw, when closed, 0·2 longer than the upper. A band of card-like teeth on each side of the upper jaw, separated by an interval, and with smaller ones on the vomer. A similar but continuous band on the lower jaw, interspersed with larger acute distant teeth.

The first dorsal fin triangular, slightly higher than long, commences an inch before a point vertical to the vent, and terminates over the first rays of the anterior anal fin. Second dorsal ends just behind the termination of the first anal; the third begins before the origin of the

second anal, and is coterminal with it; its first and second rays are short, the third and fourth rays longest, the remainder gradually shorter. Pectorals fan-shaped, and reaching to a line with the vent. Ventrals small, distant. The first anal fin long, and high anteriorly; the fourth and fifth rays longest, thence gradually diminishing in size. The second anal, in shape and size, resembles the third dorsal. Caudal forked, with numerous accessory rays.

Color. Dark blackish green above; abdomen and base of anal fins whitish, minutely punctate with brown. Chin and sides of the opercles bronzed. Lateral line silvery white. Pupils bluish black; irides silvery, mottled with brown. Tongue silvery, margined with dusky. All the fins, except the ventrals, dark brownish black; the pectorals being somewhat lighter. Ventrals white.

Length, 13·0. Depth, 3·0. Length of the head, 3·0.
Fin rays, D. 13.19.19; P. 18; V. 6; A. 24.19; C. 22 $\frac{3}{3}$.

The Coal-fish is often taken off the harbor of New-York, in company with the Cod and the preceding species. I have received the names for it of *Pollack* and *Black Pollack*, from our fishermen. It is not a common species, and is usually confounded with the preceding. In the pollack, the vent is under the middle of the first dorsal; in this species, it is under the posterior third of the same fin.

This is one of the comparatively few oceanic fishes which range on both shores of the Atlantic. It is a northern fish; and on this side of the Atlantic, the coast of New-York must be assigned as the extreme southern limits of its geographic range.

THE GREEN POLLACK.

MERLANGUS LEPTOCEPHALUS.

PLATE XLV. FIG. 146. — (STATE COLLECTION.)

Characteristics. Deep green above the lateral line. Lower jaw shortest. Length twelve to eighteen inches.

Description. Head small; facial line sloping from the dorsal fin, and slightly arched. Body compressed, subcylindric. Scales not adherent, small, oblong on the head, orbicular on the body. Lateral line tubular, curved, nearly concurrent with the dorsal outline. Eyes large. Nostrils double, tubular, nearly equidistant between the eyes and the end of the snout. The upper jaw receives the under jaw within it, although, when extended, the latter appears somewhat the longest. Card-like teeth on both jaws and on the palatines, and recurved teeth on the upper and lower pharyngeals.

The first dorsal fin pointed, subtriangular, commencing vertical to a point equidistant between the vent and the tip of the ventrals, and terminating above the origin of the first anal; second dorsal as high as the preceding, and slopes backward nearly to the level of the back; the third dorsal begins and ends on the same line with the second anal, with which it agrees in size and

shape. Pectorals pointed, reaching nearly to the end of the first dorsal. Ventrals small and feeble, placed anterior to the margin of the opercles. The first anal stout at its origin, and ending just before the termination of the middle dorsal. Caudal forked.

Color. Deep green above the lateral line; silvery white beneath, and minutely punctate with black. Pectorals and all the vertical fins deep greenish black, and minutely punctate. Ventrals white. Pupils black; irides silvery.

Length, 12·0; of the head, 3·0. Extreme depth of body, 3·0.
Fin rays, D. 12.19.19; P. 18; V. 6; A. 27.20; C. 22 $\frac{5}{5}$.

This is not often captured, although I have reason to believe that it is not uncommon on the coast. It is called *Young Haddock* by our fishermen, under the belief that it is the young of the *M. æglefinus;* but from this it is generically distinct. In color, configuration of its scales, the extension of its pectorals, and radial formula, it differs from *carbonarius*, with which it is otherwise closely allied. It resembles very much the *Green Cod* of Europe, *M. virens;* but that species is represented to be of a light glossy green color, with even jaws, and its sides irregularly marked with a number of small dark blue spots.

The specimen which supplied me with the above description, was taken by hook in Long island, out of a large schole. They *flipped* in the same manner with the menhaden or bony-fish, and were at first supposed to be that species. They seemed to be very timid; for upon a very slight noise in the boat, they all disappeared.

GENUS BROSMIUS. *Cuvier.*

A single long dorsal fin extending the whole length of the back. Anal long. One barbel at the chin. Ventrals fleshy.

THE CUSK.

BROSMIUS VULGARIS?

PLATE XLIV. FIG. 143.

Brosmerus flavescens? Le Brosme jaune. LESUEUR, Memoirs du Museum, Vol. 5, p. 158, pl. 16.
Gadus (Brosmius) flavescens? Yellow Tusk. RICHARDSON, Faun. Bor. Am. Vol. 3, p. 257.
Brosmius vulgaris, The Cusk. STORER, Massachusetts Report, p. 136.

Characteristics. Dark slate above, passing into yellowish on the sides. Dorsal, caudal and anal bordered with black and white. Length two to three feet.

Description. Nose broad, and somewhat flattened. Scales small, rounded, covering every part except the maxillary bones and the end of the jaws. Lateral line in a straight line to the commencement of the anal, when it curves down and goes off straight. Mouth large. Upper jaw slightly longest; both filled with numerous sharp recurved teeth. Teeth also on the palate and pharyngeals. Anal coterminal with the dorsal. A single barbel under the chin.

Color. Uniform dark slate. (In large individuals, body brown above, with yellowish sides; abdomen white, and yellow ventrals.) The dorsal, anal and caudal dusky, margined with blue and edged with white.

Length, 25·0.
Fin rays, D. 96; P. 23; V. 5; A. 73; C. 35.

There are apparently two American species described under the name of *Cusk*, and both, we apprehend, confounded with the *vulgaris* of Europe. We have seen neither, and can therefore only judge by the descriptions of preceding writers. The European Tusk has a broad furrow from the nape to the dorsal fin. According to Bonnaterre, it is deep brown above, with some transverse spots on the sides. It has forty-nine dorsal and thirty-seven anal rays. The Cusk of Storer is uniform dark slate, and has ninety-six dorsal and seventy-three anal rays. He mentions a specimen weighing twenty pounds, which was brown above, with yellowish sides and white abdomen. Dr. Smith mentions a Cusk of Massachusetts, which is greyish, mottled with brown spots in warm seasons, but nearly black in winter, and with a broad and spotted lateral line. The meagre indications of Lesueur are as follows: "Color yellow, with the dorsal, pectoral? and anal edged with black and white; lateral line "arched above the pectorals; eye large and oblique; the lower jaw with two barbels." No mention is made of the dorsal or anal rays. We look confidently to Dr. Storer to eliminate these different species. The figure referred to above is from the European species, and is only introduced to illustrate the typical form of the genus.

GENUS PHYCIS. *Artedi, Cuvier.*

Two dorsal fins; the first short, the second long. A single barbel at the chin. Ventrals with a single ray, sometimes divided at their tips.

THE AMERICAN CODLING.

PHYCIS AMERICANUS.

PLATE XLVI. FIG. 150. — (STATE COLLECTION.)

Blennius ——, *Chuss at New-York.* SCHŒPFF, Beobachtungen u. s. w. Vol. 8, p. 143.
Enchelyopus americanus. SCHNEIDER, BLOCH.
Merlu barbu. DUHAMEL, Traité des Pesches, p. 148, pl. 25, fig. 4.
Gadus longipes, Codling. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 372.
Phycis furcatus. STORER, Boston Jour. Vol. 1.
Phycis americanus, American Hake. STORER, Report on the Fishes of Massachusetts, p. 138.

Characteristics. Reddish brown. The third ray of the first dorsal more than twice the height of that fin. Ventrals extending to the vent, or a little beyond it. Length one to three feet.

Description. Body cylindrical, tapering from the region of the pectorals; sides subcompressed. Scales small, orbicular. Lateral line distinct, arising from above and anterior to the margin of the opercles; concurrent with and near the back, until it reaches above the vent, when it rather suddenly curves down, but still keeping near the back, and going off straight through the tail. Head pointed, flattened above; its outline sloping, nearly straight. Snout prominent. Upper jaw projecting beyond the lower, and both armed with several series of minute incurved teeth, with a free interval in front of the upper jaw. Patches of similar teeth on the anterior part of the vomer. Tongue large, distinct and fleshy. Barbel on the chin very small. Eyes large and prominent. The stomach with numerous cæcal appendages. Abdominal cavity lined with a black pigment, in which the air-bladder, with its curiously fimbriated processes, is beautifully displayed.

The first dorsal fin triangular, originating a short distance behind the base of the pectorals. The third filamentous ray, from its extreme delicacy, is often destroyed; but when perfect, is as long as the dimensions given in the specific phrase. The second dorsal commences immediately behind the first; its subequal rays are enveloped in a very stout membrane; a few of its posterior rays become rapidly shorter. Pectorals long and rounded. Ventrals originate midway between the line of the base of the pectorals and the angle of the jaws. It is usually stated to consist of but one ray on each side. I am disposed to consider them as double, but enveloped in a common membrane for more than half the length of the shortest filament. When perfect, they extend to, and even a little beyond the vent. The anal fin commences opposite to the twelfth or thirteenth ray of the second dorsal, and terminates a little anterior to the end of that fin; its rays are subequal, gradually diminishing in length towards the tail. Caudal rather long, and fan-shaped.

Color. Reddish brown, with slight metallic reflections on the cheeks, and a dark patch beneath the orbits. Abdomen lighter, mixed with grey, and a faint pinkish or orange hue along the base of the anal. Irides silvery, tinged with yellow. Anal bluish white, darkly margined along its tip with brownish. This has suggested to a writer of no authority, the name of *marginatus*. Dorsals dark brown. A faint crescent-shaped mark on the caudal fin.

Length, 12·0.
Fin rays, D. 10.52; P. 17; V. 2; A. 50; C. 18 $\frac{3}{3}$.

This species appears to feed chiefly on the smaller crustacea, as in several which I opened, the stomachs were filled with nothing else. It is very abundant at some seasons. Our markets are usually supplied with them from the coast east of Cape Cod, but they also occur in our waters. It is most abundant in the early part of the autumn, and varies in weight from three to thirty pounds. It is called indiscriminately *Hake* and *Codling* by our fishermen; but as the name of *Hake* is already applied to another genus (*Merlucius*), it seems preferable, in order to avoid confusion, to make use of the other name. I found them equally palatable with the common cod.

The geographic range of this species appears to be from the coast of New-York northwardly.

THE SPOTTED CODLING.

PHYCIS PUNCTATUS.

PLATE XLVI. FIG. 149.

The Spotted Cod, Gadus punctatus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 372, pl. 1, fig. 5.
The Spotted Phycis, G. (Phycis) punctatus. RICHARDSON, Faun. Bor. Am. Vol. 3, p. 253, figure.

Characteristics. Lateral line alternately black and white. A black spot on the first dorsal. Caudal emarginate. Length ten inches.

Description. Body cylindrical, subfusiform. Head small. Scales soft, and very deciduous. Lateral line nearly straight, black; with alternate white dashes a quarter of an inch long, occurring at spaces half an inch apart. Barbel under the chin, small. The jaws, palate and throat armed with minute sharp teeth; lower jaw shortest. Ventral fins bifid, and its longest ray two inches in length.

Color. Back and sides pale brown or whitish, with lines between the scales; neck and belly dull white, with suffusions of cream color. The first dorsal marked above with a black spot, surmounted by the white tips of the rays. In some individuals, an imperfect whitish straight fillet under the lateral line. Anal fin brownish, edged with blackish.

Length, 10·0. Depth, 3·0.
Fin rays, D. 9 or 10.47; P. 13; V. 1; A. 47; C. 23.

This is an exceedingly rare but distinct species. It occurs from the coast of New-York to the gulf of St. Lawrence.

The *Gadus tenuis* of Mitchill (Tr. Lit. and Phil. Soc. p. 372), is a *Phycis*, and if the radial formula be correct, a new species. It is fifteen inches long; brownish back and sides. D. 11.54; P. 16; V. 2; A. 44; C. 25.

FAMILY PLANIDÆ.

Body flat, compressed vertically. Upper surface dusky, and of various colors; beneath white. Dorsal single, extending the whole length of the back. Both eyes placed on the same side of the head. No air-bladder. Branchial rays six.

Obs. This family, which comprises about one hundred and thirty species, is well characterized. In the want of symmetry in the head, it stands alone among the vertebrated animals; the eyes being both on the same side of the head, one usually above the other, and often unequal in size. This want of symmetry extends to the mouth, and often to the pectoral fins. In the exceptions, the eyes are placed on a different side from their usual situations, and are then termed *reversed* individuals; more rarely it happens that both sides are colored, when they are said to be *doubled*.* The terms *right* and *left*, or *dextral* and *sinistral*, have been variously applied; and some confusion has also arisen from the fact, that in transferring the drawings of these fishes to copper, the true position of the sides has been reversed, and the figure and description at variance. The rule proposed by Bloch, is to place the fish on its edge, with the tail to the observer, and the dorsal fin uppermost; the fish is then said to be dextral or sinistral, according as the colored side is on the right or left hand.

We have on our coast examples of the following generic groups: *Platessa*, *Hippoglossus*.

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* Thus the *P. melanogaster*, Mitchill, is a doubled variety of *P. dentatus*.

GENUS HIPPOGLOSSUS. *Cuvier.*

Body elongated. Eyes and color on the right side. Jaws and pharynx armed with strong and sharp teeth.

THE HALIBUT.

HIPPOGLOSSUS VULGARIS.

PLATE XLIX. FIG. 157.

Pleuronectes hippoglossus. LINNEUS, p. 456.
H. id., Halibut. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 386.
Hippoglossus vulgaris. CUVIER.
The Halibut. STORER, Massachusetts Report, p. 145.

Characteristics. Very large. Uniform dark ashen grey on the upper side; white beneath. Caudal fin concave. Length one to eight feet.

Description. Body elongated; breadth to the length as one to two and a half nearly; smooth, covered with minute oval scales. The lateral line arched over the pectorals. Length of the head to the total length as one to four. Eyes moderate, dextral. Nostrils double, slightly in advance of the eyes; the anterior tubular. Gape of the mouth large. Lower jaw longer than the upper, and both with large fleshy lips. Teeth in a double row in both jaws, robust, distant, acute; the posterior range somewhat larger. Branchial rays seven.

The dorsal fin commences above the eye, and ends near the caudal; its middle rays longest. Pectorals oblong, arising below the medial line of the body. Ventrals beneath the base of the pectorals; very small, with its third ray longest. The first rays of the anal fin shortest, gradually increasing in length to the seventh or eighth ray; thence gradually diminishing and coterminal with the dorsal. Vent with a separate urinary passage behind. Caudal fin crescent-shaped.

Color. Head, body and fins of the right side an ashen grey, more or less darker; the left side white, immaculate. Pupils black; irides golden.

Length of head and body, 24·0. Breadth of body, 9·5.
Fin rays, D. 100; P. 16; V. 6; A. 74; C. 17 $\frac{2}{2}$.

The individual described above is small. They are usually of a more considerable size. I have seen them of the weight of two hundred pounds, and Dr. Storer informs us of one which reached the enormous weight of six hundred pounds. It is a savory fish, particularly the smaller individuals, and occasionally appears in unusually large numbers on the coast. Its capture on the shoals of Nantucket at one time afforded employment to eighty vessels of from sixty to eighty tons each. They are very voracious; swimming near the ground, and devouring other Planidæ, as well as shells and crustacea. It occurs on both shores of the Atlantic, inhabiting the northern seas, and migrating south on the approach of spring, as far as the

coast of New-York, and returning in June or July. Others suppose that he retires to deeper waters in the winter, without changing his latitude. He is found as far north as the coast of Greenland. Specimens sometimes occur with the eyes and colored surface on the left side.

GENUS PLATESSA. *Cuvier.*

Body rhomboidal. Eyes and color usually on the right side. A row of cutting obtuse teeth in the jaws, and frequently paved teeth on the pharyngeals. The dorsal advances over the upper eye, and leaves a naked interval between it and the caudal. Form rhomboidal. A few small cæca.

* EYES AND COLORED SURFACE ON THE RIGHT.

THE NEW-YORK FLAT-FISH.

PLATESSA PLANA.

PLATE XLVIII. FIG. 154. — PLATE XLIX. FIG. 158. REVERSED AND DOUBLED.

The New-York Flat-fish, Pleuronectes planus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 387.
The Flounder of Massachusetts, Platessa plana. STORER, Massachusetts Report.

Characteristics. Elliptical. Greenish with darker spots. A concealed anal spine. Length six to eighteen inches.

Description. Form elliptical. Length of the head to the total length as one to five and a half. Scales small, orbicular, beautifully ciliate under the lens, and of nearly equal dimensions throughout the head and body. Just before the anal fin, is a sharp horizontal spine. The lateral line very distinct, and rising very gradually towards the head, curves above the pectorals. Under jaw rather longest. Mouth small. A single row of minute acute teeth in the jaws; the half of the jaw next to the colored portion, without teeth. Teeth on the palatines.

The dorsal fin commences above the upper eye, and gradually increases in the height of its rays to the posterior third, when it as gradually diminishes to the end. Pectorals small, fan-shaped, and of nine rays. Ventrals beneath the pectorals, with the rays projecting beyond the membrane. Anal fin arises a short distance behind the ventrals, equal in height to the dorsal, and coterminal with it. Caudal broad and rounded.

Color. This is extremely variable in this species. The more usual appearance is pale greenish, with numerous darker or brownish small irregular clouds or patches over the body and fins, as is represented in the plate. Pupils black; irides golden or greenish. Pearly white beneath. Dorsal, caudal and anal faint yellowish brown. Branchial membrane bright olive. They are occasionally slate-colored and rusty brown.

Length, 8·0. Depth, 3·5.
Fin rays, D. 67; P. 10; V. 6; A. 46; C. 17 $\frac{1}{2}$.

This is the most common species in our waters, and is often called the *Winter Flounder*. It is subject to great varieties in color. Dr. Mitchill mentions having seen a specimen with the upper surface entirely white, and another with a yellow margin on the lower side. In April, I obtained an individual of this species, which presented the remarkable peculiarity of being not only *reversed* but *doubled* (see pl. 49, fig. 158). Its color on both sides was uniform bronze, with a white patch on its right side near the chin, almost entirely denuded of scales; it had the singular protuberance over the eye, noticed by Dr. Mitchill in his *melanogaster*.

It is a highly prized fish. It occurs on the coast of Massachusetts, but I am unacquainted with any other particulars respecting its geographical distribution.

THE PIGMY FLAT-FISH.

PLATESSA PUSILLA.

PLATE XLVII. FIG. 153.—(STATE COLLECTION.)

Characteristics. Small. Uniform olive brown. No anal spine. Length five to eight inches.

Description. Form rather more elongated than the preceding; depth of body alone to its length as 2·0 to 4·6. Scales moderate, elongate; the exposed surface small, with its margin rounded and ciliate; the covered surface striate. The scales cover the body and entire head, except the lower part of the cheeks, and extend high up on the caudal fin. Lateral line prominent, not concurrent with the dorsal outline, slightly curved above the pectorals, and then proceeding in a slight furrow straight through the tail. Orbits oblong, contiguous; with the interval between them scaly, not elevated. Nostrils united, with a single valvular opening before the eyes. Mouth protractile; lips fleshy; lower jaw longest, and both with series of minute conic teeth. A small patch of scarcely visible teeth on the vomer and pharyngeals.

The dorsal fin somewhat higher than the anal, commencing above the eye, and ending a short distance anterior to the termination of the anal; somewhat higher on its posterior third. Pectorals pointed, their base distant 1·1 from the end of the snout. Ventrals 0·4 long, of six rays, and anterior to the pectorals. The anal fin commences opposite to the seventeenth dorsal ray. Caudal rounded.

Color. Above nearly uniform olive brown, with indistinct darker blotches toward the dorsal and anal fins; beneath bluish white. Fins tinged with rufous. Pupils black, surrounded by a golden ring.

Length, 5·0. Depth of the body, 1·8.
Fin rays, D. 67 – 69; P. 11; V. 6; A. 50; C. 15 $\frac{3}{3}$.

This small flat-fish is taken in the shallow bays about New-York, in September. It is little valued as an article of food, as is known in the markets under the name of *Sand Flounder*. It is closely allied to the preceding, and especially to the brown variety.

THE RUSTY FLAT-FISH.

PLATESSA FERRUGINEA.

PLATE XLIII. FIG. 155. — (STATE COLLECTION.)

The Rusty Dab, Platessa ferruginea. STORER, Report on the Fishes of Massachusetts, p. 141.

Characteristics. With numerous minute rusty spots over the body. Dextral. A series of four white distant rounded spots along the dorsal and abdominal outline. Length twelve to twenty inches.

Description. Elliptical; roughened by orbicular scales, which likewise cover the opercular plates. The scales are rounded about the middle of the body, smaller towards the abdomen and tail, and extend to the tips of the caudal rays; they extend far on and even beyond the eyes, and are furnished with from four to six denticles on their posterior edges; beneath they are rounded, becoming pointed towards the tail, and destitute of denticulations. The lateral line curves shortly over the pectoral fin, and then proceeds in a straight line through the middle of the tail. The snout produced; a strong bony ridge separates the narrow space between the orbits, curves upward and backward, and appears to form a continuation with the lateral line. Eyes large, approximated and prominent. A row of small blunt teeth in each jaw, almost obsolete on the colored side; on the upper pharyngeals, they are arranged in three transverse rows on a disk on each side, each series consisting of from eight to twelve small incurved teeth on each side. Branchial aperture large, and the membrane dilated with six rays.

The dorsal fin arises above the anterior portion of the orbit, and runs backward to within a short distance of the accessory caudal rays; the rays of this fin extend beyond the membrane, and its tips are white; they are longest between the thirty-fifth and fiftieth rays. The pectorals nearly equidistant between the back and thorax, rounded; the first three simple, the remainder branched; on the uncolored side, they are all simple. Ventrals extending to the origin of the anal. The anal has a horizontal spine before it; its rays gradually increase in size to the twenty-fifth, when they as gradually diminish to the last, which is opposite to the termination of the dorsal. Caudal rounded, with rays nearly three inches long; all, with the exception of the first on each side, branched. The membrane of all the fins exceedingly delicate and diaphanous; the opercular membrane almost transparent. Ovary, in the specimen before me, long and triangular, almost filling up the abdominal cavity, and extending to within three inches of the base of the caudal rays. No air-bladder nor cæca.

Color. Head and body greenish, with numerous irregular, crowded, chocolate or rust-colored spots, giving a rusty hue to the animal. These spots appear to be confined to the body alone, not extending over the fins. A series of four or five distant obscure rounded spots along the dorsal, and a similar series along the abdominal outline. When held up to the light, these spots are deep black, and the whole body pellucid. Beneath white, except the lower margins

of the dorsal and anal fins, the posterior margins of the body and tail, and the whole caudal fins, which are all deep yellow.

Length, 18·0. Breadth, 8·5.
Fin rays, D. 81; P. 10; V. 6; A. 59; C. 14 $\frac{3}{2}$.

This is a rare species, and notwithstanding the discrepancies in the radial formula, I believe it to be identical with the *ferruginea* of Dr. Storer. The fishermen say that it is only found in deep water. It has hitherto been observed only on the coasts of New-York and Massachusetts.

THE TOOTHED FLAT-FISH.

PLATESSA DENTATA.

The Flounder of New-York, Pleuronectes dentatus. MITCHILL, Trans. Lit. and Phil. Soc. N. Y. Vol. I, p. 390.
Platessa dentata, The Flounder of New-York. STORER, Report on the Fishes of Massachusetts, p. 143.

Characteristics. Reddish brown. Mouth large; lower jaw with a blunt spine at the chin. Length twenty to twenty-five inches.

Description. Figure elliptical. Length of the head to the body, exclusive of the caudal fin, as one to four. Mouth very large. Upper jaw slightly projecting over the lower, and both furnished with a single row of prominent sharp teeth separated from each other, so that when the mouth is closed, the teeth of one jaw shut into the spaces between those of the opposite jaw. The lower jaw has a blunt spine at the chin. Lips small. Eyes separated by a bony ridge, covered with scales similar to those over the whole head. The lateral line makes a curve over the pectorals, so slight as to be scarcely observable. The dorsal fin commences over the eyes. The anal behind the middle of the pectorals.

Color. On the right side reddish brown or pale brown, without lines or spots. Pupils black; irides golden. The edges of the anal and dorsal fins bordered with white.

Length, 20·0.
Fin rays, D. 91; P. 11; V. 6; A. 70; C. 18.

This species is extremely common in our markets, and is called the *Summer Flounder*. It is a well flavored fish.

** EYES AND COLORED SURFACE ON THE LEFT.

THE OBLONG FLOUNDER.

PLATESSA OBLONGA.

PLATE XLVIII. FIG. 156.

The Spotted Flounder, P. oblongus. MITCHILL, Trans. Lit. and Phil. Soc. N. Y. Vol. I, p. 391.

Characteristics. Oblong. Smooth. Nearly uniform brown; occasionally with spots. Caudal fin angulated. Length fifteen to twenty inches.

Description. Oblong. Length of the head to the total length as one to four and a half. Scales small, orbicular, and deeply imbedded; they extend far up on the caudal fin. Lateral line straight from the tail, until it reaches near the tip of the pectoral, when it suddenly rises, curving convexly above it, and then proceeds with a gently concave curve to the upper angle of the branchial aperture. Nostrils double; the posterior and superior placed immediately in front of the dorsal fin. Lower jaw prominent; its symphisis deep and truncate. Eight to ten sharp stout teeth on each side of the lower jaw; six to eight similar teeth on each side of the upper jaw, and the remaining posterior portion of the jaw filled up with numerous minute teeth. Tongue smooth. Stout hooked teeth on the pharyngeals. The branchial membrane united in the centre, and strengthened by two bones forming the letter V.

All the rays of the pectoral and caudal fins branched; those of the remaining fins simple. The dorsal fin commences anterior to the upper eye, and its anterior rays are doubled over and free. This would assimilate it to the *Rhombus*, but the dorsal and anal do not approach unusually near the caudal fin. The same feature is noticeable in the anal fin, the anterior rays of which arise almost immediately behind the ventrals, with the vent on the uncolored side. Caudal fin with its central and external rays longest, producing an angular margin; its rays remarkably stout and ramose.

Color. Dark olive-green, with somewhat lighter spots on the head and body; these spots are occasionally distinct, but oftener with no vestige of them. Dorsal, anal and caudal dusky, tinged with sanguineous. The pectoral and ventral of the under side reddish; above dark olive with dusky bars. Branchial membrane bright olive above. The lower parts white, with a faint blush of pink. Interior of the mouth rosaceous. Pupils black; irides yellow.

Length, 19·0. Depth, 8·0.
Fin rays, D. 88; P. 12; V. 6; A. 66; C. 17.

This species is occasionally larger, but its average size is usually smaller than these dimensions. Although the radial formula does not precisely coincide with the fish of Mitchill, which I have cited as a synonime, yet from the extreme difficulty of being accurate in the enumeration of the rays, I can scarcely doubt its identity with his species. For the purpose of introducing uniformity into our English nomenclature, I have called the dextral species *Flat-fish*, and shall restrict the name of *Flounder* to the sinistral species of this division.

The Oblong Flounder is common along our sandy shores, and is procured abundantly in the months of September and October. It is excellent eating, and usually sells at from six to eight cents per pound. Like its congeners, it is very tenacious of life, and can be preserved in good condition for a long period.

THE LONG-TOOTHED FLOUNDER.

PLATESSA OCELLARIS.

PLATE XLVII. FIG. 152.—(STATE COLLECTION.)

Characteristics. Dorsal fin with more than ninety rays. Chin prominent. Teeth long. Upper surface with ocellated and other spots. Tail rounded. Length twelve to eighteen inches.

Description. Body oblong. Length of the head to the total length as one to five. Depth of the body alone to its length as one to two. Scales adherent, rounded; their concealed surfaces with radiating striæ, and extending over the opercles. The lateral line with a short and rapid curve over the pectorals, and thence straight. Eyes moderate, and separated by a bony ridge; the inferior smallest. Nostrils double, between and somewhat in advance of the eyes, distant; the anterior smallest. Mouth large, and when closed, the labials extending to the posterior margin of the orbits. Preopercle with a rounded angle. Branchial membrane united beneath as in the preceding. Teeth in the lower jaw long, distant, acute, and about twenty-four in number. In the upper jaw, the four in front on each side long; those on the sides small, numerous and subequal.

The dorsal fin commences anterior to the eyes; the first twenty-five or twenty-eight with free tips, the rays gradually increasing to the sixtieth ray; from the sixty-fifth, they decrease in height to the tail, ending opposite the termination of the anal. Pectorals pointed, arising under the twenty-third dorsal ray. Ventrals small, anterior to the pectorals; the second ray longest. Vent on the colored side, rather anterior to the base of the pectorals, and midway between the ventral and anal. Anal similar in shape to the dorsal; the longest rays are about the fifty-sixth. Caudal rounded.

Color. Olive brown, with from six to ten black spots bordered with white; a few of them form an irregular series along the base of the dorsal fin; the others are irregularly distributed about the body, above and below the lateral line. Intermingled with these, are numerous obscure pale spots over the surface. Pupils black; irides golden. Pectoral and ventral of the colored side frequently barred with black.

Length, 12·0 – 24·0. Breadth, 4·0 – 6·0.
Fin rays, D. 95; P. 12; V. 6; A. 72; C. 16 $\frac{2}{2}$.

This is a savory fish, which appears on our coast in the summer months. I have hitherto confounded it with the preceding; but on a reëxamination, I am satisfied that it is very dis-

tinct. From the drawings of Dr. Holbrook, there appear to be three species with ocellated spots on the coast of Carolina, allied by its markings to this flounder, but all with the caudal angular.

(*EXTRA-LIMITAL.*)

P. stellata. (PALL. RICH. l. c. p. 257.) Liver brown above, with numerous stellated bony tubercles. Fins reddish, with broad vertical black stripes. Length twelve inches.

GENUS PLEURONECTES. (RHOMBUS of *Cuvier.*)

Eyes and colored surface on the left. Teeth in the jaws and pharynx. Dorsal fin commences anterior to the eye.

OBS. MM. Cuvier and Valenciennes having been compelled by the law of priority to restore the name of *Rhombus* to a genus of the family Scombridæ, the name of the present genus, which was also called *Rhombus*, must be changed. Mr. Swainson has proposed to restore the old name *Psetta* of Aristotle. It, however, resembles too closely the genus *Psettus* of the family Chetodonidæ, and we think it preferable to employ the neglected name of *Pleuronectes*. As the Turbot of Europe stands as the type of this genus, we shall apply this popular name to the American species; although it must be distinctly understood that the Turbot of Europe has never yet been detected on the coast of the United States.

THE SPOTTED TURBOT.

PLEURONECTES MACULATUS.

PLATE XLVII. FIG 151.

The New-York Plaice, P. maculatus. MITCHILL, Report in part, &c. p. 9.
Plaice of New-York, P. aquosus. ID. Trans. Lit. and Phil. Soc. N. Y. Vol. 1, p. 389, pl. 2, fig. 3.
Rhombus aquosus. CUVIER, Règne Animal.
R. id. STORER, Boston Journ. Nat. Hist. Vol. 1, p. 351; and Fishes of Massachusetts, p. 146.

Characteristics. Orbicular. Body and fins pellucid, with numerous black spots. The anterior rays of the dorsal with membranous slips. Length twelve to eighteen inches.

Description. Body nearly orbicular; the dorsal outline slightly concave towards the head. Scales round, minute, adherent, and depressed in the centre. Lateral line regularly arched above the pectoral, and then proceeding straight in a slight furrow to the tail. Eyes moderate, with a distinct bony ridge between them; immediately in front of this are the two nostrils, one preceding the other. Mouth large; its gape extensive. Chin with a slight protuberance. Teeth numerous, sharp and small, crowded in front of the upper jaw, and in a single series on the sides; beneath they are rather more robust, but nearly obsolete on the uncolored side of the jaw. A small patch on the vomer, and numerous crowded teeth on the pharyngeals.

The dorsal fin commences anterior to the eyes, and near the end of the snout; the first six or eight of the foremost rays have their tips detached from the membrane, and present a ragged appearance, which is not accidental, as I have observed it in all the specimens which I have examined. Attached to these rays are loose membranous slips, as exhibited in the plate. This fin is about an inch high, and is coterminal with the anal. The base of the pectoral is beneath the twenty-first ray of the dorsal; the pectoral is pointed, with the third and fourth rays longest. Ventrals longer than high, not originating from a common base as usual; the colored pectoral arising from the abdominal edge, and almost confounded with the anal; the uncolored fin is parallel with this, and two-tenths of an inch distant, on the uncolored side. The vent also is on this surface. The anal fin commences immediately over the vent, and is composed of weak flexible rays. Caudal fin an inch and a half long, and rounded.

Color. Dark olive-brown above, with rounded deep chocolate brown spots on the body, becoming larger behind, and oblong on the fins, are rather of a lighter color than the body. When held up to the light, the whole animal is diaphanous, showing the position of the viscera in the abdominal cavity. The eyes are surrounded with a faint bluish white ring, which, soon after death, changes to a dull white. On the colored side, are likewise a few distant light-colored spots. Pupils black, surrounded by a golden ring. The under side of the usual bluish white.

Length, 5·0. Depth, 3·5.
Fin rays, D. 68; P. 12; V. 6; A. 56; C. 15 $\frac{3}{2}$.

Although I feel convinced that this is the *Watery Flounder* of Mitchill, yet I cannot reconcile the radial formula of my own and other describers. I may have possibly erred in transcribing my notes. On the coast of Massachusetts, it is sold as "the English Turbot;" from which, however, it is readily distinguished by the absence of the numerous tubercles on the colored side, which characterize that species.

The Spotted or Watery Turbot is considered as a delicate article of food, and has been known to weigh twenty pounds. I have never seen them, except in two instances, larger than the dimensions stated above. It is sometimes called the *Watery Flounder*, and more frequently the *Sand Flounder*.

(*EXTRA-LIMITAL.*)

P. glacialis. (RICHARDSON, l. c. p. 258.) Ovate. Caudal cuneiform, entire. A spine before the anal. Scales small, rough. Lateral line straight. Length nine inches. *Arctic Seas.*

GENUS ACHIRUS. *Lacépède.*

Destitute of pectoral fins. Dorsal and anal fins distinct from the caudal. Eyes and colored surface on the right side. Gape of the mouth curved downward.

THE NEW-YORK SOLE.

ACHIRUS MOLLIS.

PLATE XLIX. FIG. 159. — (STATE COLLECTION.)

* *Pleuronectes lineatus, Sole in New-York.* SCHŒPFF, Beobachtungen u. s. w. Vol. 8. p. 148.
Pleuronectes mollis, New-York Sole. MITCHILL, Report in part, &c. p. 9; ID. Lit. and Phil. Soc. Vol. 1, p. 388, pl. 2, fig. 4.
Achirus mollis. CUVIER, Règne Animal, Vol. 2; STORER, Fishes of Massachusetts, p. 149.

Characteristics. Greenish brown, with numerous black blotches, and from four to seven transverse dark lines across the body. Length three to six inches.

Description. Form oval, approaching to orbicular. Snout rounded, vertical in front. Scales small; their exposed surfaces orbicular; free margins with radiating spines. The scales ascend high up on the dorsal, anal and caudal fins; and when the mucosity is cleared off from the body, it becomes rough to the touch. Lateral line nearly straight, submedial. Eyes small; the lower behind the angle of the mouth. A single white and tubular nostril in advance of the eyes, and placed near the border of the upper jaw. Gill-covers on the under side, covered with many fleshy filaments, disposed in irregular groups. A membranous expansion over the edge of the upper jaw on the white side; this membrane is fringed with white filaments. Rictus of the mouth turned downward. Teeth in both jaws minute, and barely perceptible.

The dorsal fin commences on the fore part of the upper jaw, and is coterminal with the anal; the rays included between the thirty-fifth and forty-fifth are largest. Ventrals longer than the first rays of the anal fin; its first ray shortest; they are contiguous to each other, and barely leave room for the vent between them and the anal. Anal similar in shape, but shorter than the dorsal. Caudal rounded, nearly orbicular.

Color. Head, body and fins greenish brown, with numerous black blotches; smaller on the head. There appears to be two strongly marked varieties in our waters; the one with the blotches disposed as above, and another with from five to seven meandering transverse black stripes across the body; on the fins the spots become confluent, forming broad vertical black stripes. These two varieties are often intermixed; the spotted variety being often without stripes, and the striped variety with obscure spots; in both, the under side soiled white, with numerous circular dark brown spots. The abdominal cavity extends to the tail. The stomach has no cæca, and the intestines present three principal convolutions.

Length, 5·5. Depth, 1·7.
Fin rays, D. 56; V. 4; A. 40; C. 16.

This species is common in our waters. It is usually taken in seines in the months of Sep-

tember and October, but is too small to be of much importance as an article of food. I have eaten of them, and found them to be very delicate. They abound on the shallow flats on the Jersey shore opposite New-York, where they are called *Calico* and *Coverclip*. It has been taken as high up the Hudson as Peekskill. When first taken from the water, it escapes readily from the hand by an undulatory movement, in which it is aided by its mucous surface, and by an elevation of its scales beneath. By the same means, it can make considerable progress over a moderately smooth surface. It is extremely tenacious of life, and I kept one alive four days out of water. Among the drawings of Dr. Holbrook, I notice a figure of this, or of a closely allied species. The head appears somewhat more pointed, and the back is covered with meandering dusky blotches, intermixed with eight black transverse angular bars across the body and tail. It is probably the true *lineatus* of Linneus.

The range of the New-York Sole extends from Nantucket to Carolina.

(*EXTRA-LIMITAL.*)

Genus PLAGUSIA, *Cuvier*. No pectoral fins. Dorsal, caudal and anal fins united.

P. fasciata. (HOLBROOK, Illustrations, pl.) Body elongated, terminating in a point. With seven broad transverse dusky bands. *South-Carolina.*

Under the name of *P. apoda*, Dr. Mitchill has described, from the Bahama channel, a species of the genus *Monochirus*, which will probably be found on the southern coast of the United States. (See Am. Month. Mag. Vol. 2, p. 244.) It is nearly circular, with twenty transverse black stripes.

FAMILY CYCLOPTERIDÆ.

A small family, characterized by the ventrals being united into a disk or cup-shaped form. Body smooth, and without scales. Eyes placed one on each side of the head. Branhcial rays six.

GENUS LUMPUS. *Cuvier.*

Two dorsals; the first often so much enveloped in a tuberculous skin, as to appear like a hump of the back. Second dorsal with rays, and opposite to the anal. Body deep and rough, with bony tubercles.

THE LUMP-FISH.

LUMPUS ANGLORUM.

PLATE LIV. FIG. 175.—(STATE COLLECTION.)

Lumpus anglorum. WILLUGHBY, Historia Piscium, p. 208.
Cyclopterus ceruleus, The Blue Lump-fish. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 480, pl. 2, fig. 7.
C. lumpus, The Lump. RICHARDSON, Fauna Boreali Americana, Part 3, Fishes, p. 260.
Lumpus vulgaris. CUVIER, Règne Animal, Vol. 2.
L. id. STORER, Fishes of Massachusetts, p. 151.

Characteristics. Blue. Three series of tubercles along the sides. Dorsal lump with a fissure on its posterior part. Length ten to twenty inches.

Description. Body suborbicular in its outline, compressed, more especially towards the dorsal ridge. It is soft and flaccid, resembling a lump of jelly. Instead of scales, the body is covered with minute tubercles, and horizontal series of larger ones. From the anterior portion of the dorsal ridge, the outline slopes in a concave line to the orbits, where it becomes abruptly declivous to the snout. The space between the orbital ridges, flat. On the top or ridge of the back, is a series of from five to seven large compressed tubercles, and a smaller row on the anterior slope. Behind the large tubercle, there is a deep oblique fissure; posterior to which the dorsal surface becomes flat, with a series of from three to five sharp unequal tubercles on each side, the posterior largest. A series of large tubercles commences before the eyes, curves over the pectorals, and then proceeds in a straight line through the upper part of the tail. Another series of which the first four are very large and closely approximated, commences a short distance above the ventral part of the branchial aperture, curves slightly downward, and, with a slight interruption, passes through the lower part of the tail; there is still another series on each side of the abdomen, consisting of about six inequidistant large tubercles. Eyes lateral, prominent. Nostrils double; the anterior large and tubular; the posterior scarcely perceptible, when they will be found just within the first large tubercle, on the superciliary ridge. Branchial rays four, slender. Mouth moderately large, broad; the

under jaw slightly longest. Small blunt teeth, in three or four rows, in front of each jaw; teeth also on the pharyngeals, and a small patch on the base of the tongue, which appeared to be distinct from the pharyngeals.

The dorsal hump without any vestige of rays; at least, I found none in two which I examined. Dorsal fin with thick soft and indistinctly branched rays, opposite to the anal, higher than long, and rounded on the margin. Pectorals short, with a very broad base; not united beneath, but partially concealing the ventrals. Ventrals immediately under the pectorals, united into a disk (see figure), with a funnel-shaped cavity in the middle; the margins softly dentated. Anal higher than long, placed under the dorsal, which it resembles in size and shape. The rays of the anal, caudal, dorsal and pectoral fins covered with small bony tubercles. Skin very thick. Stomach enormously large; the abdominal cavity lined with a pearl-colored membrane. Intestines very long; numerous cæca. No air-bladder.

Color. Above deep blue, becoming paler on the sides, which are tinged with yellowish beneath, approaching to red. Ventrals bright yellow, and in the spawning season, bright red. Irides yellowish.

Length, 11·0. Depth, 7·0.
Fin rays, D. 10; P. 20; A. 10; C. 11.

This fish agrees so exactly in all its characters with the Lump-fish of Europe, that I cannot hesitate to place it under that species. It is often much larger than the dimensions noted above. Dr. Storer noted one which weighed seventeen pounds. In Scotland, it is called the *Cock-paddle* and *Hen-paddle*; in England, *Lump Sucker*, *Lump-fish*, and *Sea Owl*; in France, *Licorne de Mer*. In the former country, it is considered a great delicacy, though it agrees with few stomachs, on account of its oily nature. In this country it is not eaten. By means of its cup-shaped ventrals, it adheres so firmly to any solid substance as to be removed with extreme difficulty. Pennant relates, that upon throwing one of these fishes into a pail of water, it adhered so firmly, that upon taking hold of the fish by the tail, he lifted the whole vessel, although it held several gallons.

It is a native of the northern seas; the coast of New-York being its most southern locality hitherto observed.

We have not observed the *C. minutus* of Pallas, which is a beautiful species about an inch long, and distinguished by two white tubercles on its sides. Its occurrence on the coast of Massachusetts rests only upon the authority of Dr. Smith, in his Natural History of the Fishes of Massachusetts, p. 221. Nor have we seen any species of the genus *Liparus*, on this side of the Atlantic. According to Sabine, one species, *L. vulgaris*, was taken in Davis' Straits.

FAMILY ECHENEIDÆ.

A flattened disk on the upper part of the head, composed of numerous transverse cartilaginous movable plates, by means of which the animal is enabled to attach itself to other bodies. Eyes one on each side of the head.

Obs. The position of this family here, is very doubtful. By some ichthyologists it has been arranged among the Spine-rayed fishes. There are but few species, and those chiefly of the tropical seas.

GENUS ECHENEIS. *Linneus.*

Body elongated, covered with small scales. A single dorsal, placed opposite to the anal. Mouth wide, with numerous small pectiniform teeth on the jaws. Teeth on the vomer. Branchial rays eight. No air-bladder. Contains few species.

THE WHITE-TAILED REMORA.

ECHENEIS ALBICAUDA.

PLATE LIV. FIG. 177. — (STATE COLLECTION.)

The White-tailed Remora, Echeneis albicauda. MITCHILL, Am. Month. Magazine, Vol. 2, p. 244.
The Indian Remora, E. naucrates. STORER, Massachusetts Report, p. 153.

Characteristics. All the fins margined with white. A dusky longitudinal band along the body. Length twelve to twenty inches.

Description. Body cylindrical, elongated. Skin granular, and covered with a viscid mucus. Head nearly one-sixth of the total length; flat above, with a broad disk extending from the tip of the upper jaw, and beyond the margin of the opercles; it is surrounded by an elevated border, and is divided throughout its length by a fleshy partition, on each side of which are from twenty-one to twenty-three pair of transverse plates. In four specimens which I examined, the plates varied in number as just noted. The lower jaw broad and rounded, projecting 0·5 beyond the upper jaw, with numerous recurved card-like teeth. Two series of teeth on the upper jaw, and likewise on the vomer and pharyngeals. Opercles smooth, rounded. Eyes large.

The dorsal fin arises just in front of a line vertical to the vent; it is long and low, elevated in front, and gradually diminishing behind. The pectorals broad, arising at a point near the dorsal outline of the body, and above the branchial aperture. Ventrals below the pectorals, and united by a delicate membrane. Anal corresponding in position and shape with the dorsal, and beneath that fin. Caudal even at the extremity, rounded at the tips; its rays are soft and branched, and surround the extremity of the elongated tail.

Color, of a fresh specimen just from the water. Slate brown above; lighter beneath. A broad black band extends from the angle of the mouth to the tail. The lateral line is placed on the upper margin of this longitudinal band, where it may be indistinctly traced. Along the back, a series of triangular dark colored marks like an inverted letter Λ. Beneath, mottled slate and whitish. Irides silvery; pupils black. Pectorals and ventrals edged with white; dorsal and caudal with a white border on their anterior rays, broad on the first ray, and gradually diminishing and becoming effaced on the posterior rays. Tips of the caudal broadly edged with white.

Length, 16·0. Depth, 2·5.
Fin rays, D. 33; P. 18; V. 7; A. 30; C. 18.

This interesting species is not uncommon on the coast of Long island, and has been several times brought to me by those who took it in ordinary seines. This circumstance would seem to indicate that it is not as constantly attached to other species as is commonly supposed. From being often found sticking to the shark, it is called in this vicinity the *Shark-sucker*. I have seen a specimen which had ascended a considerable distance up the Hudson river. It appears most commonly in July and August. The species of this genus have furnished romance writers, under the name of naturalists, with an abundance of marvellous anecdotes, which are now generally discredited. All the species are natives of the tropical seas, and they are only to be considered in the light of accidental visitors on our coast.

THE INDIAN REMORA.

ECHENEIS NAUCRATES.

Echeneis naucrates. LINNEUS. SCHŒPFF, Beobachtungen u. s. w. Vol. 8, p. 145.
Big Oceanic Sucker, E. naucrates. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 377.
Shipmaster Echeneis, E. id. RICHARDSON, Faun. Bor. Am. Vol. 3, p. 266.

Characteristics. Olive brown, without stripes. Twenty-two to twenty-four transverse plates on the disk. Length thirty-one inches.

Description. Figure of the shield (disk) elliptical, rather inclining to oval; its longer diameter six and a half inches; its shorter, two and three-quarters; with twenty-four bars, separated through the middle. Tail not convex, though my specimen may have been perhaps deficient in that part.

Color, of the head, dusky brown or olive, interspersed with whitish clouds. Belly and neck dusky white, with carnation and green about the gill membrane; and greenish along the chin, cheeks, neck, pectoral fins, belly, vent and roof of the anal fin away to the tail. A white longitudinal cloud on each side, near the belly.

Length, 31·0. Girth, 10·5. Weight four pounds ten ounces.
Rays, Br. 9; P. 19; V. 5; D. 34; A. 34; C. 21.

I insert this species as I find it in Mitchill's account of the Fishes of New-York. It varies somewhat from the description of the *E. naucrates*, but I am inclined to believe that the number of transverse plates is (although restricted within certain limits) not constant in number in the same species. It certainly is not in the following.

The *E. naucrates* has been observed on the banks of Newfoundland.

THE COMMON REMORA.

ECHENEIS REMORA.

Echeneis remora. LINNEUS. SCHŒPFF, Beobachtungen u. s. w. Vol. 8, p. 145.
Echeneis remora, Small Oceanic Sucker. MITCHILL, Transact. Lit. and Phil. Soc. Vol. 1, p. 378.

Characteristics. Dusky brown; lighter beneath. Adhesive disk with seventeen or eighteen transverse bars. Tail concave. Length 12 – 18 inches.

Description. Form as in the preceding. Length of the head about one-fifth of the total length. Head flattened above, with a disk extending from near the tip of the upper jaw to the ends of the pectorals, and equal to one-third of the total length. Seventeen to eighteen pairs of bony laminæ, the edges of which are furnished with rows of minute tooth-like projections. Mouth wide; lower jaw longest; a single band of small incurved teeth in the upper jaw, also on the vomer and tongue. Branchial aperture large. Dorsal and anal opposite and coëqual. Pectoral small and rounded. Ventrals narrow, and with a membrane attaching them to the body. Caudal fin crescent-shaped.

Color. Dusky brown above; the under part of the body lighter. The fins darker than the rest of the body.

Length, 12·0 – 18·0.
Fin rays, D. 21; P. 22; V. 4; A. 20; C. 20.

The indications given by Dr. Mitchill are sufficiently explicit to lead me to arrange this species among those fishes, which, occasionally at least, visit our shores. Schœpff saw both this and the preceding species taken from the bottoms of vessels in the harbor of New-York.

(*EXTRA-LIMITAL.*)

E. 14. *laminatus.* (STORER, l. c. p. 155.) Reddish brown. Adhesive disk with fourteen serrated bars. Length five and a half inches. *Coast of Massachusetts.* An juv.?

ORDER IV. APODAL.

No ventral fins.

FAMILY ANGUILLIDÆ.

Body very much elongated and cylindrical, for the most part of a serpentiform figure. Scales scarcely apparent, being imbedded in a soft and thick skin. Air-bladder of various singular forms. No cæcal appendages.

Obs. A very natural group, with numerous subdivisions, and comprising about one hundred species.

GENUS ANGUILLA. *Cuvier.*

The dorsal fin commencing considerably behind the pectorals, and uniting with the anal to form a caudal fin. Lower jaw longest. Mouth with a row of teeth in each jaw, and a few on the anterior part of the vomer.

THE COMMON NEW-YORK EEL.

ANGUILLA TENUIROSTRIS.

PLATE LIII. FIG. 173.

Muræna anguilla, Eel. Schœpff, Beschreib. u. s. w. Vol. 8, p. 138.
The Common Eel, Anguilla vulgaris. Mitchill, Trans. Lit. and Phil. Soc. N. Y. Vol. 1, p. 360.
The Fresh-water Eel. Mitchill, Am. Month. Mag. Vol. 2, p. 241.

Characteristics. Greenish olive above; yellowish beneath. Head small, tapering to the jaws. Length one to two feet.

Description. Body long, cylindrical, compressed on the sides of the tail, which is pointed. Surface covered with a thick mucus, concealing scales so exceedingly minute as to be visible only in the dried skin under a lens. Lateral line straight, indistinct. Head small, flattened above, and pointed; lower jaw longest. Eyes rather large in proportion to the size of the head, and placed just above the angle of the mouth. Nostrils horizontally oval, placed just before the eye, and on a line with the upper part of the orbit; a short tubular cirrus on the anterior pair, on the edge of the upper jaw. Branchial aperture crescent-shaped, and just before the base of the pectoral fin. Numerous series of mucous pores about the head. Teeth in both jaws, numerous, small, acute and crowded; resolving themselves into three or four rows on the branches of the jaws, and forming on the anterior part of the upper jaw a large patch

which unites with a similar one on the anterior part of the vomer. The branchial membrane forms a large dilatable pouch, with thirteen or fourteen slender rays on each side.

The dorsal, caudal and anal fins are united, and composed of such minute and delicate rays as to be enumerated with difficulty. After repeated attempts, the whole number in the three united fins were estimated to range from three hundred and twenty to three hundred and forty. In a specimen fifteen inches long, the dorsal fin commences five and a half inches from the end of the upper jaw, and the vent is six inches and three-tenths from the same point. Pectoral fin narrow, obtusely pointed, with its base two inches distant from the end of the lower jaw, and composed of sixteen minute rays. Air-bladder long, linear, with its anterior extremity pointed.

Color. Greenish olive above, yellow beneath; this color extending along the base of the anal fin, nearly to the end of the tail.

I have no doubt but that Mitchill intended this species in his vague notice of the *A. vulgaris* or *Common Eel;* and also in his account of the *Success Eel*, to which he attributes, by mistake as I think, 456 rays, I think it probable, but am not so certain, that the Common Eel of Massachusetts, noticed by Dr. Storer, may also be referred to this species. It may possibly be the *M. bostoniensis* of Lesueur, as given in his brief sketch of the Murenidæ of the United States; but the description is too incomplete to enable me to determine it with certainty. It approaches the *A. acutirostris* of Yarrel (Vol. 2, p. 284), and may be considered as the representative of that species on our coast.

The common eel is exceedingly savory, and from its abundance, is a very cheap article of food. It is caught in all our bays and creeks, at all seasons of the year. In the spring and summer, it is taken in large wicker baskets called *eel-pots*, and also by torch light in the evening with a spear. They are also taken in winter by breaking a hole in the ice, and spearing them as they lie torpid in the mud. They are very voracious; water insects, small fishes, and all dead animal substances are sought after with equal avidity. The structure of their branchial pouches enables them to live out of water for a long period; and as they can move along the ground, it is not uncommon to find them shifting their quarters from one creek to another, by crawling through the grass. This species appears to live equally well in salt, brackish, or even fresh water. We have examined the *Silver Eel* of the fishermen, and are disposed to consider it only as a variety of the above. It is silvery grey above, with a clear satiny white abdomen, separated from the color above by the lateral line.

THE BEAKED EEL.

ANGUILLA ROSTRATA.

Muræna rostrata. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 1, p. 81.

Characteristics. Greyish or bluish above; beneath white. Snout elongated. Body tumid in the centre. Length one to two feet.

Description. "Snout elongated, pointed and straight. Eyes large, and situated very near "the angle of the mouth. Body tumid in the centre, and narrowed to a point at both extre- "mities.

Color. "Upper parts varied with grey and olive, sometimes of a slate blue; lower parts "white. Dorsal and anal fins reddish, which color deepens as it approaches the tail. Pec- "toral fins small, acute, bluish.

"Length, 18·0 – 24·0.

"Inhabits the lakes Cayuga and Geneva in the State of New-York, and is esteemed for "the table."

I transcribe the above short notice of a species which appears to be distinct, in order to call the attention of naturalists to it. I have not had an opportunity to examine it.

THE SEA EEL.

ANGUILLA OCEANICA.

Anguilla oceanica, The Sea Eel. MITCHILL, Journ. Acad. Nat. Sciences, Vol. 1, p. 407.

Characteristics. Brownish above. Tail pointed. Jaws equal. A dark bluish border on the vertical fins. Length four feet.

Description. Jaws even; lips remarkably thick and fleshy. Nostrils tubular. Eyes covered with the common skin. Branchial rays nine. Tongue smooth, fleshy at the sides and tip, and furnished with a distinct frenum. Lateral line distinct, straight, disappearing before it reaches the tail; it is elevated enough to be felt by the finger. Teeth separate and acute; a single row in the upper jaw, which "enlarges to a toothed patch, reaching back along the palate more than half an inch." In the lower jaw, traces of two rows of short and small teeth within the outer serrated row. In the throat, two roundish patches of short file-like teeth above; and an oblong one on each posterior branchial arch below. Vent twenty and a half inches from the head. The dorsal originates at a point three inches behind the pectoral fins. Tail taper, and elongated. Pectorals small, rounded.

Color. Brown on the back; pale on the sides; beneath smutty white. Pectoral fins tipped with bluish white or pale blue; the vertical fins with a margin of a dark or somewhat bluish color.

Length, 50·0. Depth, 5·0 nearly. Weight nine pounds.

The characters noted above announce a new generic group in this family. Some years since, I arrayed this as the representative of a new genus *Isognatha*, in a catalogue of New-York fishes; but it is evidently improper to form such generic subdivisions without examining the specimens upon which they are founded, and such an opportunity has never presented itself. I have seen it in detached portions for sale in the market, but have never examined a perfect individual. It may possibly be included under *Conger*, with a slight alteration of the characters of that genus. Such a change is already being attempted by some of the English ichthyologists. In Cuvier, the lower jaw is said to be shortest in all the known species. Parnell, in his generic characters of *Conger*, says "lower jaw not projecting beyond the upper."

THE BULL-HEAD EEL.

ANGUILLA MACROCEPHALA.

Muræna macrocephala, Bull-head Eel. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 1, p. 82.

Characteristics. Head very large and elevated. Olive yellow above, with a golden band from the angle of the mouth, extending beyond the pectoral fin.

Description. Snout short; lower jaw reflected. Head very large and elevated. Eyes large and prominent. Pectoral and anal fins reddish. Dorsal and anal fins terminating in a point.

Color. Above olivaceous yellow; the lower parts pure white.

Inhabits Saratoga lake. Mr. Lesueur states that it is a good table fish, and that he has seen, in the market of Philadelphia, an eel so nearly resembling the above, that he would be unwilling to consider it as distinct.

(*EXTRA-LIMITAL.*)

A. bostoniensis. (LESUEUR, l. c. Vol. 1, p. 81.) Greyish brown above; greyish beneath. Vent yellow ochre. Length twenty-four inches. *Northern Coast.*

A. argentea. (ID. Ib. p. 82.) Body much compressed. Silvery grey above, separated from the silvery white abdomen by a distinct lateral line. Length two feet. *Northern Coast.*

GENUS CONGER. *Cuvier.*

Lower jaw not projecting beyond the upper. The dorsal fin commences above the pectorals, or a short distance behind them. Chiefly oceanic, and are farther distinguished from Anguilla *by the greater number of their vertebræ.*

THE AMERICAN CONGER.

CONGER OCCIDENTALIS.

PLATE LIII. FIG. 172. — (CABINET OF THE LYCEUM.)

Anguilla conger, The Conger Eel. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 360.

Characteristics. Jaws with a single series of contiguous equal teeth. The dorsal arising two inches behind the base of the pectorals. Length three to five feet.

Description. Head one-eighth nearly of the total length, pyramidal, flattened above. Lateral line distinct, and with a series of whitish punctures through its whole length. Eyes large, longitudinally ovate, and near the superior plane of the head. The posterior nostril placed in an oval cavity immediately in front of the eye, opening by an oblong aperture immediately under the superior margin; beneath, numerous papillæ occupying the remaining part of the cavity; the aperture itself is capable of being closed by a membrane with laciniated borders. The anterior nostrils on each side of the tip of the snout, with a short truncated tube; between these are two mucous pores on the tip of the jaw, and behind these two others of an oval shape. Seven others in a horizontal line on each side, above the base of the pectorals. Lips large and fleshy. Tongue broad and smooth. Teeth small, cylindrical, equal, closely applied to each other, and forming a single series in each jaw. A broad patch on the front of each jaw, of small, slightly recurved and crowded teeth. Branchial aperture in front of the pectoral, and rising up as high as two-thirds of its base; its length 0·9. The dorsal fin commences about two inches behind a point vertical to the base of the pectorals, and is continuous with the caudal and anal, containing altogether about five hundred and fifty rays. The tail ends in an acute tip. Pectorals oblong, with seventeen rays, the tips extending as far back as the origin of the dorsal.

Color. Dark olive brown above; chin, space behind the pectorals, and all beneath soiled white. Dorsal and anal of a deep black hue along their margins.

Length, 45·0; of the head, 6·0.

We should have considered this as identical with the European *Conger Eel*; but in the only accurate description which we have been enabled to consult, the teeth are said to form a broad band in each jaw, or according to others, in one or two rows on the sides.

The Conger Eel may be considered as rare on our coast. I have seen few in the markets; the flesh has a peculiar unsavory taste. It is apparently a vicious animal, snapping when captured at every thing near it.

GENUS OPHIDIUM. *Cuvier.*

Head smooth. Body elongated, compressed. Dorsal, caudal and anal united. Scales small, irregularly imbedded in the skin. Gill-openings large. Teeth on the jaws, vomer and palatines. Two pair of barbels depending from the throat.

THE NEW-YORK OPHIDIUM.

OPHIDIUM MARGINATUM.

PLATE LII. FIG. 169. — (STATE COLLECTION.)

Cirrhous Ophidium, O. barbatum. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 362, pl. 1, fig. 2.

Characteristics. Grey, with three dusky stripes along the body. Length nine inches.

Description. Body elongated, eel-shaped, much compressed, tapering to an acute point. Abdomen tumid. Surface smooth, with small cup-shaped elliptical distant scales (see figure), deeply imbedded in the skin. These scales are radiately and concentrically striate, producing a beautifully reticulated appearance under the lens; the largest are 0·1 in their largest diameter, and none are arranged in a regular series. The disposition of the scales on the surface, which is only evident after immersion in spirits, is very peculiar; it has none of the symmetry observed in all the other scaly fishes, and can scarcely be understood without reference to the plate. An interrupted series of these scales is observed along the dorsal fin, a short distance above its base. The lateral line arises above the upper angle of the branchial aperture, follows the dorsal outline about a quarter of an inch below it, and becomes obsolete about an inch from the end of the tail. Head smooth, scaleless, smaller than the anterior part of the body. Snout prominent; lower jaw shortest. Eyes large, 0·3 in diameter, and placed in the anterior third of the distance between the eye and the margin of the opercle; nearly their diameters apart. From the orbits to the snout, the facial outline is somewhat concave, and then convex over the snout. Nostrils small, nearer to the end of the snout than to the eyes. A broad fleshy process or extension of the skin above the upper jaw. Branchial aperture large, dilated above; branchial rays seven. Tongue smooth, pointed. Bands of very minute sharp teeth in both jaws, forming four to six series. Similar but smaller teeth on the vomer and palatines.

The dorsal fin commences gradually from a point two inches and two-tenths distant from the extremity of the snout, and proceeds subequally, but insensibly diminishing from its height of 0·25 to its union with the caudal, which is pointed. The vent is placed 3·2 from the extremity of the snout. Immediately behind it arises the anal, highest at its origin, but gradually decreasing to the caudal. The rays of all the fins are very minute and delicate, so as to be enumerated with difficulty. In a space included within an inch, twenty rays were counted, which would give a total for the three united fins of two hundred and twelve rays, of which seventeen may be assigned to the caudal, leaving one hundred and twenty to the dorsal and seventy-

five to the anal. Pectorals broad, obtusely pointed, and composed of twenty-two delicate rays; its length 0·9, and width of its base 0·35. Two barbels on each side, having a common origin from the hyoid bone, a short distance behind the symphisis of the chin. The posterior pair 1·1 long; the anterior pair half that length, and both with filamentous tips.

Color. Head and upper part of the body and tail ash grey. Abdomen whitish; the lower part of the sides of the body pale, mixed with soiled yellowish. Three obscure dusky longitudinal stripes on each side of the body: the first along the base of the dorsal fin; another along the lateral line, and a third below this on the sides, only visible on the middle part of the body, and becoming effaced towards the tail. Dorsal, caudal and posterior portion of the anal edged with black on their margins. Pectorals yellow. Barbels white. Pupils black; irides yellowish, varied with white. A faint interrupted dusky streak on the lower portion of the membrane of the dorsal fin, near its base.

Length, 9·0; of the head, 1·5. Depth of the body, 1·3.
Fin rays, D. 120; P. 22; A. 75; C. 17.

This very rare and curious species was taken in a seine in the harbor of New-York, in company with a schole of the Striped Bass (*Labrax lineatus*). It is doubtless the *O. barbatum* of my venerable friend Dr. Mitchill, which is too succinctly noted in the work cited above. Swainson asserts that Cuvier and all authors describe the *barbatum* of Europe as having four distinct barbels, whereas there is in reality only one, divided at its base into four filaments; no good representation, he adds, yet exists of this species. In the species under consideration, there are undoubtedly four, and I can not reconcile my account of it with the *barbatum* of foreign writers. It has so much the habit of some of the Gadidæ, and more especially of the genus *Brotula*, that our fishermen call it the *Little Cusk*.

(*EXTRA-LIMITAL.*)

O. stigma. (Richardson, l. c. p. 273.) Dilute brown, spotted, and with a purplish spot near the beginning of the dorsal fin. Length five inches. *Kotzebue's Sound.*

Genus Fierasfer, *Cuvier.* Body hyaline. Dorsal so thin as to resemble a simple fold of the skin. Snout very obtuse. No barbels.

F. borealis? (Peck, Am. Acad. 2d part, Vol. 2, p. 46, pl. 4.) White eel; with a rounded tail. Dorsal of a uniform color. Br. 6; D. 76; P. 14; A. 49; C. 22. *Northern Coast.*

F. parryi. (Richardson, l. c. p. 274.) Greenish brown above. Pectoral fins large, with thirty-seven rays, and extends beyond the vent. Length four to eight inches. *Northern Seas.*

GENUS AMMODYTES. *Linneus.*

Body and head elongated. Dorsal fin extending nearly the whole length of the back; anal fin long, and both separated from the caudal. Caudal forked. Lower jaw longest. Branchial aperture large. No cæca nor air-bladder.

THE AMERICAN SAND-LAUNCE.

AMMODYTES AMERICANUS.

PLATE LII. FIG. 167.

Ammodytes tobianus. BLOCH.
A. id. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 363.
The Sand Eel, A. tobianus? STORER, Fishes of Massachusetts, p. 159.

Characteristics. The dorsal fin commencing over the tips of the pectorals. No stout long tooth on the vomer. Length six to twelve inches.

Description. Body elongate, subcompressed, covered with very minute scales. Lateral line straight, indented, and running near the base of the dorsal fin. Head flattened above, compressed on the sides. The lower jaw projecting, prominent beyond the upper, and ending in a conical indurated tip or prolongation, which, when the jaws are closed, is nearly or quite in the plane of the summit of the head. Eyes large; the upper margin of the orbit nearly in the plane of the facial outline. Nostrils double, nearly midway between the eyes and end of the snout. Mouth large. Teeth exceedingly minute. No long bifurcated tooth on the vomer. Opercles long, smooth and silvery, radiated on their lower margin.

The dorsal fin long and low, with a delicate membrane, and the slender rays projecting beyond it; it commences above the tip of the pectorals, and is placed in a groove. The pectorals pointed, one-third the length of the head, and composed of thirteen rays. A narrow delicate membrane extends from the base of the pectorals to the abdomen. The anal fin commences under the twenty-seventh dorsal ray, of subequal rays, and coterminal with the dorsal. Caudal fin forked.

Color. Head and body above bluish brown, intermixed with silvery and light green; sides and beneath silvery. Gill-covers silvery. Caudal as dark as the upper part of the body. Pupils black; irides silvery.

Length, 4·0 – 6·0.
Fin rays, D. 56; P. 13; A. 27; C. 17.

This is not a rare species, but, from its insignificant size, never appears in the markets. It appears to be closely allied to *A. tobianus*, but seems to differ in the absence of the long vomerine tooth and other particulars. Mr. Linsley of Stratford has communicated to me a

specimen which agrees in all respects with the preceding, but its radial formula is D. 60; P. 13; A. 27; C. 17.

The young of this species are frequently washed on shore, after heavy northerly gales, in my neighborhood. It is a northern species, and its congeners are said to bury themselves in the sand.

THE BANDED SAND-LAUNCE.

AMMODYTES VITTATUS.

PLATE LX. FIG. 197.

Characteristics. Seven projecting spinous processes before the dorsal fin. A broad silvery band on the sides. Length four to six inches.

Description. Body oblong, subcompressed, slender. Scales minute, deeply imbedded in the cellular tissue, ciliated on their edges. The lateral line running near the base of the dorsal fin, until it is confounded with it near its termination; its situation is indicated by a series of tubes. Head small, pointed, flattened and grooved above, compressed and edged beneath. Eyes large; the margin of the upper orbits on a plane with the profile of the head, and half their diameters apart. Nostrils double, distant, and placed in a horizontal groove. Snout terminating in a bifid tip. Mouth protractile; lower jaw longest. When the mouth is extended, the lower ends of the labials pass below the line of the lower jaw. Even aided by the lens, I could detect no teeth in the jaws, and only two slight osseous projections, scarcely amounting to teeth, on the vomer. Opercle oblong, thin and silvery.

The dorsal fin arises vertical to the posterior margin of the interopercle; its seven first rays (if they may be considered as such) composed of short spinous processes, almost concealed in the common membrane. The dorsal fin proper is composed of slender, simple, nearly subequal rays; it commences over the tip of the pectorals, and very gradually decreases to its termination a quarter of an inch from the tail. Pectorals long and pointed. The vent a long fissure 0·4 in length, behind the middle of the total length; posterior to this commences the anal, composed of very slender rays connected by a very delicate membrane. Caudal forked. No air-bladder.

Color. Greenish olive above, with a broad silvery band along the sides, which is margined above with blackish. Pupils black; irides silvery. Belly white.

Length, 4·5.
Fin rays, D. 7.54; P. 15; A. 28; C. 19 $\frac{2}{2}$.

I saw this species several years ago near Sag-Harbor, Suffolk county. I referred it at that time, with doubt, to the *A. lancea*. I have since had an opportunity of examining another specimen from the northern coast, which, on comparison with my notes, I find to be identical with my Sag-Harbor species. I can only place this species here provisionally, for it is very doubtful whether it belongs to this genus.

Section 2. Lophobranchii.

Gills in little round tufts, disposed in pairs along the branchial arches, instead of being arranged in continuous series like the teeth of a comb.

This section constitutes Order V., which contains but one family in our waters.

FAMILY SYNGNATHIDÆ.

Body mailed with transverse angular plates. Opercle large; branchial opening very small, and formed by a membrane which only exhibits vestiges of rays. Dorsal single. Species small. No cæca; with an air-bladder.

Obs. A small group, containing about fifty species, chiefly from the seas of the tropical and temperate regions.

GENUS SYNGNATHUS. *Linneus, Cuvier.*

Body elongated, slender, covered with a series of indurated plates parallel to each other. Snout prolonged into a tube, with the mouth placed at the extremity. No ventral fin. Males with a pouch for the reception of the female roe.

THE BANDED PIPE-FISH.

Syngnathus fasciatus.

PLATE LIV. FIG. 174. — (STATE COLLECTION.)

Smaller Pipe-fish, Syngnathus typhle. Mitchill, Trans. Lit. and Phil. Soc. N. Y. Vol. 1, p. 475.

Characteristics. Ashen grey, with brownish transverse bars across the tail. Dorsal as high as the depth of the body. Length six to ten inches.

Description. Form irregularly four-sided posterior to the vent, the lower side being largest; anterior to the vent, the body is polygonal, and covered with horny plates. Above, the surface of the back is depressed, and this is produced by the union of a series of carinated plates, which cause a ridge on each side. This ridge is minutely pectinated, and the plates themselves are vertically striate on the sides. Sides of the body vertical, and covered by a series of carinated plates, which ascend at the vent, and unite at the termination of the dorsal with the carinated plates on the back. Twenty-five of these plates were counted from the opercle to the end of the dorsal. The abdomen is formed by three series of carinated

plates, of the same description with the preceding; the carinæ however, are less denticulated than those on the dorsal ridges. The middle series on the abdomen is composed of nineteen plates, obsoletely carinate under the pectorals, and terminating at the anal pouches. The series of keeled plates on the sides of the abdomen pass into those on the sides posterior to the vent; and anterior to this part, are nineteen in number. Through the whole length of the body and tail, the number of plates in the lateral and dorsal series amounts to fifty-nine or sixty. It results from this, that the disposition of the carinated plates is seven-sided anterior to the anal pouches. On the summit of the head, and on the nape, is a short series of three keeled plates, subsiding into a slightly raised line between the eyes, and continued on the upper surface of the prolonged upper jaw, nearly to its extremity. Head gently declivous from the nape to the origin of the tubular jaw. Nostrils double, contiguous, and situated in a triangular cavity anterior to the eyes; the posterior largest. Eyes large, 0·15 in diameter. Jaws, measured from beneath the orbits, 0·65 long. Head and jaws, measured to the branchial aperture, are to the total length as one to seven and a half. Opercles narrow in front, enlarged and rounded behind, with a series of moniliform raised lines radiating in a curved direction from the upper anterior extremity. There is no medial raised line, as in the European species.

The dorsal fin is 0·3 high, with a base an inch and a tenth long; it is composed of forty-two simple slender and subequal rays. It arises opposite the sixteenth dorsal plate, and occupies a little more than the space included between ten of these plates. The pectoral fins are placed rather low down, are slender and pointed, the tips reaching to the third dorsal plate. The anal fin very minute, placed behind the pouch, and beneath the middle of the dorsal; it is composed of two, with the rudiments of a third ray, and is 0·15 long. Caudal fin broad and rounded, with its membrane concave between the rays.

Color. Ash brown above, light grey beneath; the portion posterior to the anal pouches with eight or nine light colored bands, each covering two plates.

Length, 8·6.
Fin rays, D. 42; P. 15; A. 3; C. 12.

This species appears to be closely allied to the *S. peckianus* of Storer, but differs in the following particulars: The body of one species, in front of the dorsal fin, heptangular. Head and rostrum proportionably longer; the greatest depth of the rostrum scarcely exceeding twice the greatest depth of the head. The dorsal fin 0·25 longer than the head, measured to the posterior part of the opercle. The absence of the radial formula does not enable me to carry the comparison farther. I suppose that Dr. Mitchill, under the erroneous name of *S. typhle*, had our species in view.

The Banded Pipe-fish is rarely taken alive. It occurs more usually thrown up on sea-beaches, after heavy gales. It is of no use as an article of food.

THE GREEN PIPE-FISH.

SYNGNATHUS VIRIDESCENS.

PLATE LIV. FIG. 176. — (STATE COLLECTION.)

Characteristics. Dark olive green above; yellowish beneath. Length five to seven inches.

Description. Body elongated, slender, and tapering to a fine point at the insertion of the caudal fin. In recent specimens, it is hexangular before the vent or anal fin; but in cabinet specimens, a slight carina is observed in the middle of the belly. There are nineteen abdominal plates anterior to the vent; the first plate is pointed. Thirty-nine plates were counted behind the anal fin. Head depressed between the superciliary ridges, with a carina in the furrow, extending behind the eyes. Eyes proportionally large. Opercle large and rounded, with radiating striæ. Jaws long, tubular, rounded, with a delicate ridge above. Mouth small, vertical; lower jaw longest. No vestiges of teeth.

The dorsal fin long and low; the middle rays longest. It commences on the anterior third of the body, and contains forty rays. The pouch, when present, is under the middle of this fin. The pectorals small, obtusely pointed, and composed of fourteen rays; its middle rays longest. Anal, when present, minute, and of three rays. Caudal rounded.

Color. Dark olive green above; yellowish beneath, and beautifully resplendent with green and gold on the sides and abdomen. These colors rapidly disappear after death, and are succeeded by a uniform dull green.

Length, 5·0 – 7·0.
Fin rays, D. 40; P. 14; A. 3; C. 9.

This species, except in color, is closely allied to the *S. fuscus* of Storer. It is very common in our waters, and is frequently taken as far up the Hudson as Sing-Sing, where it breeds in the slightly brackish water. It keeps chiefly among the aquatic plants.

It is now a well established fact, that after the ova of the females of this genus are excluded, they are received and hatched in the pouches or false belly of the males. The males even carry the living young in this pouch, after they have been hatched there. In some species, the males have no pouch, but instead thereof, hemispherical depressions on the outer surface of the abdomen, into which the eggs of the female are placed.

(*EXTRA-LIMITAL.*)

S. fuscus. (STORER, l. c. p. 162.) Dull brown; lighter beneath. D. 38; P. 13; A. 3; C. 9. Length six inches. *Coast of Massachusetts.*

S. pechianus. (ID. p. 163.) Olive brown, with transverse dusky bars; golden yellow beneath. D. 45. Length six to eight inches. Hab. with the preceding.

GENUS HIPPOCAMPUS.

Snout elongated as in the preceding. Body enlarged and deep in the centre, with angular and spinous plates. No ventral nor caudal fin. Female only with an anal fin. Tail prehensile.

THE HUDSON-RIVER SEA-HORSE.

HIPPOCAMPUS HUDSONIUS.

PLATE LIII. FIG. 171. — (STATE COLLECTION.)

Syngnathus hippocampus. LINNEUS.
Sea-horse at New-York. SCHŒPFF, Beobacht. Vol. 8, p. 194.
S. id., Sea-horse Pipe-fish. MITCHILL, Trans. Lit. and Phil. Soc. New-York, Vol. 1, p. 475.
The Short-nosed Sea-horse, H. brevirostris. STORER, Massachusetts Report, p. 167.

Characteristics. A crest extending from the eye to the base of the snout. Pectorals with fifteen rays. Tubular jaws half the length of the head. Length three to six inches.

Description. Body of twelve segments, heptangular, protuberant, with three rows of tubercular points formed by the junction of the plates on each side, and a single row beneath; the tubercular points become more elevated at the place of the dorsal fin. Jaws tubular, straight, cleft at the extremity, 0·3 in length measured above, and 0·9 to the branchial aperture. A short tubercle at the base of the jaw above, and connected by an elevated crest to a distinct spine over each eye. On the summit of the head, a large bony protuberance terminating in five distinct points. The oval branchial apertures behind this protuberance. Nostrils double, round, immediately anterior to the eyes. Eyes prominent. Anal (in the female) with three rays. Tail longer than the body, quadrangular, ending in a blunted point, finless, and composed of thirty-two segments.

Color. Light brown, with iridescent opercles. Irides yellow.

Length 4·5.
Fin rays, D. 18; P. 15; A. 3.

This species varies in size from three to six inches. I cannot reconcile it with the *brevirostris* described by Yarrel, to which it is referred by my estimable friend Dr. Storer. It has even a shorter tubular jaw. All the specimens which I have hitherto had an opportunity to examine, were females. We believe that the animals of this genus stand alone among fishes, in having a prehensile tail.

ORDER VI. PLECTOGNATHI.

Gills and rays concealed beneath the skin. The maxillary bone soldered to the side of the intermaxillary, which alone forms the jaw. The palatine also soldered to the cranium. Branchial aperture a narrow fissure.

FAMILY GYMNODONTIDÆ.

Instead of the ordinary teeth hitherto observed in fishes, this family has the jaws furnished with a bony substance resembling enamel, divided internally into laminæ; these are essentially true teeth united together. The snout not produced. Inhabit chiefly tropical seas. Flesh of several species poisonous.

Obs. About sixty species have been described of this family.

GENUS DIODON. *Linneus.*

All the teeth united into a single one in each jaw. Behind the trenchant edge of each, a rounded part furrowed transversely, and aiding in mastication. No ventral fins. Skin furnished with slender prickles or stout spines.

Obs. The species of this and the following genus possess the singular property of puffing themselves up into a globular ball, and in this state, float on the surface. This is effected by swallowing the air, which is retained by a thick contractile muscle surrounding the œsophagus. This condition, with the projecting spines, serves as a means of defence. Air-bladder with two lobes. Kidneys placed high up, and have been mistaken for lungs. Liver occupies the whole length of the abdomen, and divided into many small lobes. The jaws of this genus are not unfrequently found in a fossil state, but I have not observed them in the United States.

THE SPOT-STRIPED BALLOON-FISH.

DIODON MACULATO-STRIATUS.

PLATE LVI. FIG. 185. — (CABINET OF THE LYCEUM.)

Diodon atinga, Sphericus aculeis triquetris. L.?
Toad-fish at New-York. SCHŒPFF, Beobachtungen u. s. w. Vol. 8, p. 192.
Diodon maculato-striatus, Spot-striped Diodon. MITCHILL, Lit. and Phil. Soc. Vol. 1, p. 470, pl. 6, fig. 3.
Diodon rivulatus. CUVIER, Memoires du Museum d'Hist. Naturelle, Vol. 4, p. 129, pl. 6.

Characteristics. Greenish, with numerous meandering olive brown stripes, and a few dark colored large blotches margined with green. Tail even. Length five to seven inches.

Description. Body subcubical. Front abruptly descending. Space between the orbits

concave. The whole surface, except the chin and tail, covered with sharp, recurved, triangular, compressed spines, each with a trifid base, and forming in the dried specimen a sort of bony coat of mail over the whole animal; these spines are larger above than beneath. There are prominent ones over the eyes, and a single one between the orbits. The barbels are disposed in pairs; one pair between the eyes and snout, with a slight imperforate cavity; another pair under the lower jaw, 0·2 in length; and a third, half an inch long, on each side of the vent. Branchial aperture semilunate, and covered with a loose valvular membrane. The mouth terminal, broad, with fleshy puckered lips. Teeth slightly crenulate on their margins. Tongue smooth, large and fleshy.

The dorsal fin on the posterior part of the body, over the vent, composed of thirteen rays, with a fleshy ridge in front. Pectorals four-sided, broader than long, slightly excavated on its margin. Anal opposite the dorsal, short, and rounded on its margin. Caudal long, nearly even.

Color, of a living specimen. Bright sea-green above, with longitudinal olive-brown irregular stripes on the back and upper part of the sides; on the cheeks, below the eyes, these stripes are oblique; transverse across the snout, and sloping downward over the fleshy portion of the tail. The large olive-brown spots are irregularly rounded, occasionally approaching a quadrate form, and eight in number; one on each side, above the base of the pectorals, of an oblong oval form; one on each flank, behind and partially covered by the pectoral, irregularly subquadrate; one on each side of the base of the dorsal, ascending upon that fin; this is considered by Cuvier as a single spot; finally a small oblong spot on each side, about midway between the dorsal fin and the vent. Abdomen light-colored, with a light tinge of pink. Spines on this portion of the body, inclining to orange. Pupils dark greenish; irides yellow.

Length, 7·0. Depth, 2·5.
Fin rays, D. 13; P. 24; A. 12; C. 9.

This species is not rare in our waters in summer, and is occasially taken with the hook at the wharves of the city in July and August. The specimen described was a female. Its stomach was large and very delicate, filled with fragments of shells chiefly of a species of *Nassa*. It is a southern fish, and has not yet been observed north of the latitude of New-York.

THE UNSPOTTED BALLOON-FISH.

DIODON FULIGINOSUS.

PLATE LV. FIG. 181. MAGNIFIED THREE TIMES.

Characteristics. Unspotted. Dark olive green above; bright orange beneath. Caudal fin lanceolate. Length two inches.

Description. Body subcubical, rather more slender towards the tail. Irregular series of

triangular spines on the upper surface; the extremities of which, in the living animal, are furnished with long strips of membrane. Similar spines, but more numerous, smaller and recurved, on the abdomen. Three spines over each orbit, and another equidistant between each orbit. Lips fleshy, and susceptible of being drawn over the teeth. Three or four minute barbels under the chin. Pectorals short and broad, with a slightly sinuous margin; the upper rays longest. Dorsal placed far back, and obtusely pointed. The anal fin long, placed on an elongated fleshy base. Tail slender, supporting a lanceolate caudal fin. All the fins exceedingly feeble and delicate.

Color. Above dark olive-green, tinged with brown, with meandering dusky lines as in the preceding species. Chin yellowish white. Abdomen black; but the bases of the spines are bright orange, which so far predominates as to give this color to the whole under side.

Length, 2·0. Depth and transverse diameter, 1·0.
Fin rays, D. 14; P. 22; A. 8; C. 9.

This species, which might be mistaken for the young of the preceding, is readily distinguished by its lanceolate tail. I have nothing to state in relation to its habits. The specimen which furnished me with the above description, was found in a net in the harbor of New-York in the latter part of October.

THE WARTY BALLOON-FISH.

DIODON VERRUCOSUS.

PLATE LV. FIG. 184. — (CABINET OF THE LYCEUM.)

Characteristics. Small. With rounded areolæ, from which arise soft flexible spines. Length an inch and a half.

Description. Form cuboidal oblong. The whole surface covered with numerous circumscribed and somewhat elevated areolæ, presenting a verrucose appearance. From the centre of each arises a pointed conical cutaneous process, resembling a spine. A single barbel over each orbit. Nostrils tubular. The dorsal opposed to and somewhat longer than the anal. Pectorals short, broader than long. Caudal long, emarginate.

Color. Cinereous brown above; yellowish white beneath.

Length, 1·4. Depth, 0·5.
Fin rays, D. 11; P. 22; A. 10; C. 10.

This small fish, which is found very rarely in the harbor of New-York, may prove to be the young of some species hitherto undescribed. My late friend Dr. Mitchill read a description of this species before the Lyceum nearly twenty years since, under the name of *verrucosus*. He was, however, accustomed to throw his communications into any vehicle of publication that presented itself, and resorted even to ladies' magazines, or to a daily newspaper. My attempts to find the description of this species have been fruitless.

THE HAIRY BALLOON-FISH.

DIODON PILOSUS.

PLATE LV. FIG. 180. — (CABINET OF THE LYCEUM.)

The Hairy Diodon, Diodon pilosus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 471, pl. 6, fig. 4.
Diodon asper? CUVIER, Memoires du Museum d'Histoire Naturelle, Vol. 4, p. 138.
D. pilosus. ID. Règne Animal, Ed. anglaise, Vol. 10, p. 567.

Characteristics. Body with long flexible setaceous spines. Caudal pointed. Length two to four inches.

Description. Body oblong, cuboidal. Every part of the surface, except a small space round the mouth and eyes, and another including the base of the caudal fin, furnished with bristles; these are from two to four-tenths long, directed backwards, though probably capable of erection at the will of the animal. They are somewhat longer and more crowded on the dorsal and posterior parts of the body; they are all soft and flexible, suggesting the idea of hair-like processes. Eyes large and lateral; the space between the orbital margins depressed, concave. Nostrils single, with an obliquely truncated tubular orifice. Mouth terminal, broad, with thin membranous lips. Jaws, or rather the teeth, ending in an acute tip in front. Branchial orifice ear-shaped, placed in front of the upper part of the base of the pectorals. The dorsal slightly anterior to, but over the anal; rounded on its margin, higher than wide. Pectoral short and broad; its upper rays longest. Anal fin broad, and similar in shape to the dorsal. Caudal lanceolate.

Color. Brownish above; ashy white beneath; the prickles of a metallic golden color. On the back and along the sides are several oblong, distant, blackish brown spots.

Length, 2·0.
Fin rays, D. 12; P. 20; A. 14; C. 9.

This remarkable little species, which has been occasionally taken in the bay of New-York, was first described by Mitchill. It was subsequently referred by Cuvier (Op. sup. cit.) as the young of a species which he names *asper*, two feet and a half long. It is probable that his opinion underwent some modification subsequent to the publication of that paper; for in the last edition of his Règne Animal, *D. pilosus* is cited as a distinct species.

GENUS TETRAODON. *Linneus.*

Both jaws divided in the middle by a suture, presenting the appearance of four teeth, two above and two beneath. The surface either entirely or partially covered with prickles. Form often globular.

Obs. This genus, like the preceding, has the property of inflating itself by swallowing air. When captured, they produce a sound which is caused by the rapid emission of the air. Some species are electrical. It comprises many species, which are susceptible of numerous subdivisions.

THE COMMON PUFFER.

TETRAODON TURGIDUS.

PLATE LV. FIG. 178.

Tetrodon hispidus. LINNEUS.
Toad-fish at New-York. SCHŒPFF, Beobachtungen, Vol. 8, p. 189.
Puffer, Tetrodon turgidus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 473, pl. 6, fig. 5.
Tetraodon turgidus, Swell-fish, Puffer. STORER, Report on the Fishes of Massachusetts, p. 169.

Characteristics. The whole surface roughened with prickles, except the chin and the space posterior to the dorsal and anal fins. Olive-green above; white beneath. Length six to twelve inches.

Description. Body oblong, cylindrical; when inflated, nearly globular. The whole surface, with the exceptions noted in the specific phrase, and small spaces around the nostrils and behind the pectorals, thickly covered with small acute prickles with a trifid base; these prickles are more closely sprinkled on the back and the space between the eyes. The smooth surface on the posterior part of the body advances slightly before the dorsal and anal fins, and still more on the sides. No trace of a lateral line. Head scarcely distinct from the body. Branchial aperture, a narrow sublunate slit in front of the pectorals. Eyes large, longitudinally oval; the greatest diameter 0·6, and the distance of the orbits apart slightly exceeding their diameters; the space between them, plane, sloping with a slight concavity to the jaws. Nostrils with a short filament, and nearer to the eyes than to the extremity of the snout; a small space around them, free from prickles and perfectly smooth. Jaws robust.

The dorsal fin arises anterior to the base of the anal fin, fan-shaped, higher than broad, with eight branched rays; the first short and simple, the second highest, and thence gradually diminishing to the last. Pectoral fins broad and rounded. Anal small and slender. Caudal rounded. The membrane of all the rays very thin and delicate.

Color. Above darkish olive green on the upper part of the head, body and tail, with a yellowish tinge along the sides. Sides and all beneath white, with occasionally a greenish tinge. Along the sides, from beneath the eye to the caudal fin, is an indefinite series of six to eight

oblong black blotches, which occasionally assume the appearance of transverse bars. I have seen specimens of nearly a uniform black above.

Length, 8·5. Head measured from the branchial aperture, 2·5.
Fin rays, D. 8; P. 15; A. 6; C. 9.

This curious fish receives its popular names of *Puffer* and *Blower*, from its being enabled to inflate itself when taken from the water. When lying undisturbed at the bottom of a boat, it may again be made to inflate itself by scratching its abdomen. It is a cruel diversion with boys to crush the inflated animal with a large stone, when the abdomen is burst with a loud explosion. Schœpff, who was afraid to make an assertion when it contradicted, or was not supported by the authority of Linneus, had this species before him, and referred it to the *T. hispidus*, a very different species. It was this species that Schœpff asserts to be furnished with lungs lying in the fore part of the breast, having mistaken the kidneys for lungs.

This species is scarcely ever eaten. It is abundant on our shores, and extends northwardly as far as the harbor of Boston, where it was observed by Dr. Storer. With its southerly range, I am not acquainted. It is frequently taken with the hook in fishing for black-fish on our coast, and is also taken in company with the cod and haddock.

THE CURVED PUFFER.

TETRAODON CURVUS.

The Curved Tetrodon, T. curvis. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 472.

Characteristics. Smooth and brown above, with faint transverse bars. A smooth brass-colored stripe on the side, from the head to the tail. Length two and a half inches.

Description. Back considerably arched, and smooth; belly pouched, and capable of great distension. Short sharp spines disposed in quincunx on the belly. Mouth small, the upper teeth project; the lower jaw shuts within the upper. Eyes large, and almost halfway between the snout and the gill-openings. Tail tapering, and the rays of its extremity long, and rather forked. The dorsal fin much behind, with thirteen rays growing out of a skinny protuberance. The anal has the same number, situated on a similar process. Pectorals broad, even, and composed of about sixteen rays.

Color. Back dark brown, variegated with faint bars across. The parts contiguous to the branchial aperture, brassy. Belly dull-yellow. Between the back and belly, is a smooth brass-colored stripe or riband from head to tail. General complexion brassy.

Length, 2·5. Depth, 1·0, or rather more.
Fin rays, D. 13; P. 16; A. 13; C. 15.

This description of Dr. Mitchill, which is unfortunately too concise, seems to announce a new species, and as such I have introduced it here. I have never seen a specimen, but have been accustomed to regard it as being possibly the young of the following species. This doubt can only be cleared up by a minute and more careful examination.

THE LINEATED PUFFER.

TETRAODON LÆVIGATUS.

PLATE LVI. FIG. 182. — (CABINET OF THE LYCEUM.)

T. lævigatus. LINNEUS, Syst. p. 411.
Le Lisse. BONNATERRE, Encycl. Method. p. 24, pl. 16, fig. 52 (bad.)
T. lævigatus, Rabbit-fish. SCHŒPFF, Schriften der Naturf. Vol. 8, p. 189.
Tamboril. PARRA, Des. diff. piezas, &c. p. 37, pl. 19.
T. lævigatus, Brown Globe-fish. MITCHILL, Report, &c. on the Fishes of New-York, p. 28.
T. mathematicus, Mathematical Tetrodon. ID. Trans. Lit. and Phil. Soc. Vol. 1, p. 474, pl. 6, fig. 6.

Characteristics. Olive-green above. Belly only furnished with sharp prickles. The upper part of the body with series of mucous pores, forming numerous lines. Length one to two feet.

Description. Body elongated, cylindrical, tumid in front, and gradually tapering behind. Abdomen pendulous. Summit of the head, between the eyes, plane; facial line descending to the jaws with a gentle slope. Many series of mucous pores above. One series on each side, curving under the orbits, and passing through the nostrils, (in the figure, this is inaccurately represented;) from the posterior part of this circle, on each side, proceed two others; the superior ending abruptly on a transverse row above the base of the pectorals; the other passes along the back, on each side, with a broad convex curve, descending to the space between the dorsal and anal, and then going off straight through the centre of the tail. Head not distinct from the body. Teeth remarkably robust, acute, and contiguous in front above, separated at the base. Eyes large, longitudinally oval, near the facial outline, with prominent orbits. Nostrils double, contiguous; the posterior with a filament. Lips fleshy and thick. Branchial aperture crescent-shaped, and just anterior to the pectoral fin. All above, and on the sides, smooth; chin and throat smooth. Abdomen, for an area which extends to within two and a half inches from the anal, and ascending up to the inferior part of the base of the pectorals, armed with spines. These spines or prickles are a tenth of an inch long, directed backwards, and trifid at the base; they are arranged in rather regular transverse series, and when the abdomen is distended, are about four-tenths of an inch apart.

The dorsal fin irregularly trapezoidal, emarginate above, and arises 13·0 from the end of the jaws. It contains fourteen rays, of which the first is very robust, the second 2·8 high; they then rapidly diminish to the eighth, after which they very gradually decrease in length. Pectorals short, broad, excavated behind, with seventeen rays. The upper ray 1·8 long; the ninth, tenth, and eleventh shortest. Anal similar in shape and size to the dorsal, under

which it is placed. Caudal fin wide, broadly excavated behind, almost lunate; its central rays somewhat longer than the immediately adjacent ones on the sides. Its lobes frequently unequal.

Color. On the back, dark olive-brown, passing into yellowish green on the sides, which is distinctly separated from the flesh-colored or white parts beneath. Pupils black; irides yellowish.

Length, 23·0; from the branchial aperture to the jaws, 5·5.
Fin rays, D. 14; P. 17; A. 12; C. 13.

This species was first sent to Linneus from Carolina, and by him described. Bonnaterre, in his compilation, added a few additional characters made up from a fanciful figure. It was subsequently noticed by Schœpff, but without affording any additional information. The Linnean phrase, "Ventre ab ore ad finem p. pectoralium tantum aculeato," is far from being exact, and probably misled Mitchill, and induced him to describe it as distinct. He had, however, previously referred it in his first ichthyological essay to the *T. lævigatus*. It is called *Rabbit-fish*, according to Schœpff, on account of the whiteness of its flesh.

The Lineated Puffer is by no means a common species in our waters. It ranges from the Gulf of Mexico to Rhode-Island, and, according to Parra, is poisonous.

GENUS ACANTHOSOMA.

Body globular, subcompressed, armed with spines, and susceptible of inflation. Dorsal, caudal and anal united. Teeth as in Diodon.

THE SMALL GLOBE-FISH.

ACANTHOSOMA CARINATUM.

PLATE LV. FIG. 179. — (CABINET OF THE LYCEUM.)

Diodon carinatus. MITCHILL, Annals Lyc. Nat. Hist. New-York, Vol. 2, p. 264, pl. 5, fig. 1.

Characteristics. Small. Olive-brown above; silvery on the sides and beneath. Length one inch.

Description. Body vertically oval, being higher than long. The prickles or spines are pointed, distant and striated on the sides, with a dilated rounded base, distributed in the following manner: One, small, in the centre of facial profile, over the upper jaw; one over each orbit, and another behind; three equidistant along the dorsal outline, to the dorsal; two above the pectoral fin, and one between this fin and the caudal; below the pectoral, a row of four on each side, extending from the chin to the caudal; rudiments of two other rows below these. The abdominal outline with three inequidistant spines; the spaces between them being filled up with numerous small pointed tubercles, which become obsolete on the sides of the abdomen.

Surface of the body, under the lens, exhibiting slight asperities, intermixed with scattering filaments resembling hairs. Eyes large. Nostrils small, and slightly before the eyes. Mouth small, with undivided teeth, the upper slightly projecting. Branchial fissures short, linear, nearly vertical, and contiguous to the anterior part of the base of the pectoral. The pectorals in the middle third of the length of the animal, and midway between the back and belly. The vertical fins united; the portions representing the dorsal and anal with fleshy bases, high and pointed, and resembling each other. The dorsal portion contains twenty-five rays, of which the anterior is longest; the anal portion somewhat more produced than the dorsal; the caudal portion nearly straight, and represented by a loose membrane, with nine or ten projecting hair-like rays.

Color. Olive-brown above; lustrous silvery on the sides and beneath, where it is iridescent.

Length, 1·0. Depth, 1·2.
Fin rays, P. 12; D. + C. + A. = 52.

This little fish, so remarkable for its form, was first noticed on our coast by Dr. Mitchill, under the name cited above. I am not without the suspicion that this has already been figured in Pallas (*Spicileg. Zool.* pl. 4), and described and figured by Koelreuter in *Nov. Comm. Petropol.* (Vol. 10, p. 337), with the following phrase: "Mola aculeata, limbo abdominis "producto, attenuato carnosa (pl. 8, fig. 2); length 7¼ French lines." There is a figure on the same plate (fig. 3), one inch six lines long, and one inch ten lines deep, which Koelreuter merely alludes to. The notice of the species is, however, too vague to enable me to decide upon the subject.

GENUS ORTHAGORISCUS. *Schneider, Cuvier.*

Body short, compressed, and as if truncated; spineless, and not susceptible of inflation. Dorsal, caudal and anal fins united.

THE SHORT HEAD-FISH.

ORTHAGORISCUS MOLA.

PLATE LIX. FIG. 193.—(CABINET OF THE LYCEUM.)

Tetrodon mola. LINNEUS, Syst. Nat. p. 412.
Orthagoriscus id. SCHNEIDER, BLOCH.
Cephalus brevis. MITCHILL, Med. Repository, Vol. 15, p. 195. ID. Lit. Phil. Soc. Vol. 1, p. 471.
Orthagoriscus mola, The Short Sun-fish. STORER, Massachusetts Report, p. 170, pl. 3, fig. 1.

Characteristics. Skin dark grey, rough. Depth two-thirds of its length. Length three to four feet.

Description. Form oblong elliptical, subtruncated behind, compressed. Skin covered with rough granulations, but no vestige of scales, nor of lateral line. Head not distinct from the

trunk. Eyes rather large and convex. Nostrils double, just in front of the eyes. Mouth small. Jaws armed with a broad and bony plate, sharp at the edge. Dorsal outline arched from a point opposite the anterior angle of the orbits, to a line above the base of the pectorals; thence straight to the dorsal fin. The sides of the head project out from the body quite prominently over the eyes, to the branchial aperture. Opercle directly in front of the pectorals, three inches in its greatest diameter. Largest diameter of the eyes 2·5; smaller diameter, 2·0. Snout flattened above, obtuse, and projecting about an inch in front of the upper jaw. Length of the head from the tip of the snout to the base of the pectoral fin, seventeen inches. Vent corrugated, two inches in front of the anal fin; a very obvious carina commences in front of the vent, and is continued until opposite the origin of the pectorals.

Dorsal and anal fins triangular, placed at the upper and lower posterior extremity of the fish, and six feet and a half from tip to tip. Length of the dorsal, 13·0; height, 21·0. Length of the anal, 12·0; height of the same fin, 21·0. The caudal fin borders the extremity of the body, and is connected both with the dorsal and anal fins; divided into eight digitations, of which the upper are smaller, and the sixth the largest. All the fins are of a very dense texture.

Color. Back dark grey; abdomen white; the sides of a soiled white, with silvery reflections. Pupils black; irides dark brown, encircled within by a silvery ring. A broad, nearly black band commences at the origin of the dorsal fin, and running along its base, is continued in front of the caudal and anal fins to the vent. This band is lighter colored along the base of the anal, and here also it is as narrow as at the dorsal. Along the base of the caudal it is much deeper, even equal to the least height of that fin. Edge of the caudal fin flesh-colored.

Length, 54·0. Depth, 30·0. Weight, 200 pounds.
Fin rays, D. 13; P. 13; A. 15; C. 9.

The description by Dr. Storer, from a recent specimen, is the only detailed account which we have had of this species on this side of the Atlantic. I have therefore rather preferred to adopt his description, than to present my own, which was drawn up from a cabinet specimen. It appears from the figure given by Dr. Storer, which we have adopted, that the snout is more prominent than in any of the figures which we have examined. The slight inaccuracy in the original drawing, which represents the dorsal and anal as distinct from the caudal, is corrected in the text. From a comparison of the various figures and descriptions by European writers of this rare fish, I am inclined to believe that they all relate to the same species. An originally bad figure has been successively copied, with fancied emendations, which has furnished materials for new errors. The greatest discrepancies are observed in the radial formula; but when we recollect that the membrane is exceedingly dense, we may make reasonable allowances for the difference in the various enumerations of the fin rays. It is probable that the figure given by Dr. Storer is the first accurate representation ever published.

The Great Sun-fish, or Head-fish, is not unfrequently captured along the coast. The specimen mentioned by Dr. Mitchill, was captured in the lower bay within Sandy Hook. It

weighed two hundred pounds. Its flesh is represented to be worthless as an article of food. In the young, according to Yarrel, there are within the lower jaw tooth several dull pearl-like teeth of various shapes; some thin and flat, presenting an edge; others behind, cylindrical, short, and rather pointed. These disappear with age; for we learn from Jenyns, that in the adult, the lamellated substance is undivided. Various parasitical animals, such as *Pennella sagitta* and *Tristoma coccineum*, are found frequently adhering to his body. It is a sluggish dull fish, and is easily captured. It has been known to weigh four hundred or five hundred pounds.

FAMILY BALISTIDÆ.

Body compressed. Snout prolonged from the eyes. Mouth small, with a few distinct teeth in each jaw. Skin roughened with prickles or scales. Dorsals two; the anterior sometimes represented by a single spine. Ventrals often wanting or indistinct. Pelvic bone prominent.

Obs. The number of species hitherto observed is about seventy, principally inhabitants of the tropical seas. They are often distinguished by their brilliant colors.

GENUS MONOCANTHUS. *Cuvier.*

Body covered with very minute scales, assuming the form of prickles. Extremity of the pelvis salient and spinous. A single large dentated spine, in place of the first dorsal; occasionally a small and almost imperceptible spine.

THE ORANGE FILE-FISH.

Monocanthus aurantiacus.

PLATE LVII. FIG. 186.

The Orange File-fish, Balistes aurantiacus. Mitchill, Lit. and Phil. Soc. Vol. 1, p. 468, pl. 6, fig. 1.

Characteristics. Oval. Brilliant yellow or orange. Tail uneven. Dorsal and anal bordered with dusky. Length one to two feet.

Description. Body much compressed, subovate. Mouth prominent. Facial line slightly concave. Dorsal outline, between the spine and dorsal fin, horizontal. Abdomen tumid. Surface with minute, acute, incurved prickles, which are felt opposing the hand in all directions, and extend along the rays of all the fins. Very small naked furrows may be perceived with a lens, traversing the surface, and separating the spiny prickles into minute patches or plates. Depth of the body rather more than half the total length. Mouth small and produced; the lower jaw longest, and armed with eight thin flattened teeth, of which those in

front (see figure) are long and large, with emarginated edges ; in the upper jaw, the teeth are smaller, flat and lanceolate. Eyes large, lateral, and 0·8 in diameter, and nearly a diameter and a half apart ; they are placed immediately beneath the dorsal spine. The branchial aperture oblique, linear, and nearly two inches long. Nostrils single, oblong, 0·4 long, and placed nearly on the plane of the upper margin of the orbits, from which it is 0·4 distant ; it may be closed by a membrane.

The dorsal spine two inches long, rounded, and slightly bent ; it has a small membrane attached to the posterior portion of its base, with a furrow behind for its reception when it is recumbent. By a peculiar mechanism resembling that observed in the family Siluridæ, this spine becomes fixed at the will of the animal. Just before the origin of the second dorsal fin, there is a rounded prominence, under which is concealed a long flat bone, inserted on one side of the spinous processes of the vertebræ. The second dorsal commences at a point 4·2 distant from the spine, is long and low, with flattened subfoliaceous scarcely articulated subequal rays, of which the middle ones are longest. Pectorals short, broad and rounded, placed beneath the eyes. Ventrals represented by a long ensiform bone, triangular in front, flattened behind. It is articulated in front with opercular bones, and supports the abdominal viscera. The anal corresponds in shape and size with the dorsal fin, but extends behind it ; its rays, like those of the dorsal, are cylindrical at the base, membranaceous and flattened towards the tip. The tail is oblong, linear, compressed, supporting a caudal fin composed of robust rays, of which the external are largest ; the central and lateral rays are longest, producing a double emargination on its border.

Color. Chin, lips, sides and beneath bluish white ; the remaining part of the body of a rich orange-yellow. Eyes dark greenish. Margins of the pectoral, dorsal and anal fins edged with dusky.

Length, 17·5. Greatest depth, 8·5.
Fin rays, D. 1.36 ; P. 12 ; V. 0 ; A. 39 ; C. 12.

This is a rare species in our waters. I have seen but two specimens. I did not observe the " small prong or branch" on the dorsal spine, noticed by Dr. Mitchill. A southern species, which has not been observed north of New-York. I find no description which is applicable to it in the works of foreign writers.

THE LONG-FINNED FILE-FISH.

MONOCANTHUS BROCCUS.

PLATE LVI. FIG. 183.

Balistes tomentosus? BLOCH, p. 373; BONNATERRE, Ency. Method. Vol. 18, pl. 10, fig. 32?
Tut-mouthed File-fish, Balistes broccus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 467.

Characteristics. Uniform brown. Dorsal fin with an equal convex margin. Mouth prominent, projecting. Length eight inches.

Description. Body subovate, and covered with asperities, which, under the lens, appear to be composed of small scales, each with a prickle directed backwards. No lines nor spots on the body. Back regularly convex, until a short distance before the eyes; thence sloping, with a slight concave curve to the jaws. Abdominal outline angular, caused by the prominence of the ventral fin. Eyes large, under the dorsal spine, and slightly in advance of it, with a nictitating membrane. Branchial fissure small, oblique, sublunate, and between the eyes and pectoral fins. Six to eight sharp incisorial teeth in the upper and lower jaws.

The first dorsal represented by a sharp recurved spine an inch long; along its length, on each side, a row of from six to eight sharp white teeth directed downward, and resembling white enamel. The second dorsal high, rounded equally on its margin; the anterior rays highest, ending near the caudal, and coterminal with the anal. Pectorals subacute, rounded. The anal long and low, not as high as the dorsal. The place of the ventral is supplied by an elongation of the pelvis. It presents externally a sharp rough spine, with three or four small white teeth on each side, similar to what we have noted on the dorsal spine. A loose roughened membrane, which is a prolongation of the skin, with prickles on its edge, extends from the pelvic spine to the vent. Caudal long and rounded, with its rays very ramose. Along the base of the dorsal and anal fins, a series of foramina are noticed when held up against the light.

Color. A uniform slate-brown, without spots or stripes. Irides yellowish white; pupils black.

Length, 8·0. Greatest depth, 3·0.
Fin rays, D. 1.32; P. 13; V. 0; A. 32; C. 13.

This small species is not uncommon in the harbor of New-York, being frequently found in the nets set for other fishes. Our fishermen apply to it the whimsical name of *Fool-fish*, in allusion to what they consider its absurd mode of swimming with a wriggling motion, its body being sunk, and its mouth just on a level with the water. The specimen which has furnished the above description was recent. I refer to the description of Bonnaterre with great doubt; the general shape agrees tolerably well, but I saw no trace of a second dorsal spine; and if the species be indeed identical, the subvillous appearance near the tail is hardly rendered by

the phrase "hérissé de poils." I should not have cited the name and meagre notice of Mitchill, had I not been acquainted with the species which he intended to designate under the name of *broccus*.

THE MASSACHUSETTS FILE-FISH.

MONOCANTHUS MASSACHUSETENSIS.

PLATE LVII. FIG. 187. — (STATE COLLECTION.)

M. massachusettensis, The Massachusetts File-fish. STORER, Fishes of Massachusetts, p. 174.

Characteristics. Greenish brown, with obsolete abbreviated darker stripes. Margin of the dorsal fin sinuous. Length three and four inches.

Description. Body elliptical, much compressed. Mouth prominent. Back sub-arcuated between the dorsal spine and the dorsal fin; facial line slightly waving. Skin covered with small stellated plates, which are so disposed as to feel slightly rough only where the hand is moved towards the head. Eyes large, 0·3 in diameter. Branchial aperture oblique, linear, 0·2 in length. Mouth with from six to eight teeth in each jaw, with cutting edges; the anterior pair above and beneath somewhat pointed. Nostrils in advance of the eyes, and very near the profile.

The spine representing the first dorsal fin over the posterior margin of the orbits, curved, and 0·7 long, with a short membrane at the base behind; it has twelve white decurved teeth in a double series behind, and with smaller teeth irregularly distributed over its anterior and lateral parts. The dorsal fin with the first three rays are subequal, the succeeding four higher and longest, thence gradually descending to the posterior rays; the last two or three rays very short: the rays of all the fins simple. Pectorals feeble, with the fifth and sixth rays longest and subequal. At the place of the ventral, a stout pelvic spine, protruding externally about two-tenths of an inch, with four white acute spiculæ projecting forwards, and smaller ones over its surface. The margin of the cuticular fold covered with sharp stellated spines. Anal agreeing in size, and nearly in shape, with the dorsal. Tail elongated, linear, with a rounded fin; the sides of the rays with minute spines.

Color. Dark olive-green, with a yellowish tint on the chin and throat. Anal and dorsal yellowish green. Caudal light olive-green. Pectorals light reddish. A faint bluish tint above the eyes, and between the spine and dorsal fin. Faint abbreviated dark oblong streaks along the sides. Irides dull golden; pupils black.

Length, 3·8. Greatest depth, 2·0.
Fin rays, D. 1.34; P. 15; V. 0; A. 30; C. 13.

This small species, which is closely allied to the preceding, was first noticed by Dr. Storer. It is common in our waters, and is most numerous in the month of September. It ranges to the north of Cape Cod.

THE THREAD FILE-FISH.

MONOCANTHUS SETIFER.

PLATE LIX. FIG. 194. — (CABINET OF THE LYCEUM.)

Characteristics. Brownish, with one or more of the anterior dorsal rays elongated into filaments. Length five to seven inches.

Description. Body elongated; its length exceeding twice its depth, and covered with asperities as in the foregoing species, which extend over the fin rays. Branchial aperture long, oblique, and anterior to the base of the pectoral fin. Tail elongated. Eyes large. The dorsal spine above the posterior margin of the orbits, 0·9 high, with nine white lateral decurved teeth. The dorsal fin with its first ray 0·5 long; its second filamentous, 1·3 long; the third filamentous, but shorter than the second; the remaining rays nearly twice the length of the first, and subequal until we reach the twenty-second, when they gradually decrease in length. I am not sure whether the first ray is entire. Pectorals broad and rounded, with the tips of the rays slightly detached. The rays of the anal increasing in length to the fourth, thence subequal to the nineteenth, when they decrease; the last ray minute. Caudal long and rounded, with flattened rays.

Color. Dull brownish grey, with obscure darker mottlings on the sides; beneath rather lighter. Irides yellowish white.

Length, 5·5. Greatest depth, 2·1.
Fin rays, D. 1.33; P. 13; V. 0; A. 33; C. 13.

This fish, which was taken in the harbor of New-York in August, appears to be undescribed. It bears a certain resemblance to the *Cochino* of Cuba, described by Parra (p. 15, pl. 9), in its filamentous dorsal, but in other respects is totally different. In some specimens brought to me, the stomach was filled with small crabs, and the first ray only of the dorsal fin filamentous.

GENUS ALUTERES. *Cuvier.*

The pelvic bone entirely concealed beneath the skin. Body elongated, covered with small and scarcely visible grains. A single spine representing the first dorsal, as in the preceding genus.

THE LONG-TAILED UNICORN-FISH.

ALUTERES CUSPICAUDA.

PLATE LIX. FIG. 192.

The Sharp-tailed File-fish, Balistes cuspicauda. MITCHILL, Am. Month. Mag. Vol. 2, p. 326.
The Unicorn File-fish, Aluteres monoceros? STORER, Fishes of Massachusetts, p. 175.

Characteristics. Brown, varied with orange. Tail lancet-shaped, and nearly half the length of the body. Length six to nine inches.

Description. Body elongated; back nearly horizontal between the dorsal fin and spine. Facial line straight, sloping. Abdomen regularly arched. Mouth prominent, projecting, small, upturned. The surface of the body covered with minute asperities, like shagreen. Teeth in the jaws lamellated, with pointed tips; those of the lower jaw closing within the upper. Lips thin and membranaceous, scarcely covering the teeth. Eyes large. Nostril in a line with the upper margin of the orbit. Branchial aperture very oblique, and 0·6 long.

The dorsal spine stout, short, serrated, with a furrow behind for its reception; second dorsal low, with its middle rays highest, and reaching to within 0·8 of the caudal fin. Pectorals short, and placed beneath the orbits. Anal terminates beyond the end of the dorsal; the rays of its posterior third portion are longest. The caudal fin arises from an elongated tail, with its outer rays stoutest, and shorter than the others, which are alternately large and small, and all serrated towards their bases; the middle rays are two and a half inches long, and all, with the exception of the two outer ones, are filamentous at their tips.

Color. Yellowish brown, varied with irregular dashes and blotches, to such a degree that scarcely any two individuals are precisely similar; the general disposition is, however, to oblique bands of dusky brown, with the intervening spaces lighter. Irides yellow.

Length, 8·5. Greatest depth, 2·5.
Fin rays, D. 1.38; P. 13; V. 0; A. 42; C. 12.

This is not an uncommon species in our waters. The *monoceros* of Storer is either very closely allied, or what is more probable, is the young of our Long-tailed Unicorn-fish. The color varies still more than is noted above. I have seen them of a uniform brown, without any spots or clouds whatsoever.

Dr. Mitchill has indicated another species of *Aluteres* from the waters of this State, but his account is too vague to permit us to class it among the established species. To call the attention of ichthyologists to it, I add the few notes he has left on the subject.

"BALISTES ANGUSTICAUDA, *Narrow-tailed File-fish.* With a considerable gibbosity before "the eyes; a single horn curved forward, and bending backward at the point; with a very "prominent flabby belly; with an isthmus-shaped tail, narrow immediately behind the anal "and dorsal fins, and wider towards the origin of the caudal fin; with a very projecting "snout and small mouth; with a white iris, and a skin marked by shades of dark brown over "the whole surface. This character is derived from a drawing of a fish taken at New-York." (*Am. Month. Mag.* Vol. 2, p. 327.)

GENUS BALISTES. *Cuvier.*

Body covered with hard rhomboidal scales, not imbricated. Two dorsal fins; the first composed of two or more spines. Mouth with sharp teeth. Extremity of the pelvis salient and prickly, and behind it a few rays which are considered as representing the ventrals.

OBS. One of the subdivisions of this genus, which is so rich in species, has the tail unarmed, and large scales behind the branchial aperture. To this division, which as yet has received no name, belongs the following:

THE DUSKY BALISTES.

BALISTES FULIGINOSUS.

PLATE LVII. FIG. 188. — (CABINET OF THE LYCEUM.)

Characteristics. Dusky brown, unspotted. Caudal fin doubly emarginate; a single spine between the first and second dorsals. Length twelve inches.

Description. Body oblong, elliptical. Back regularly arched; the facial profile descending obliquely, and slightly curved to the prominent mouth. Depth of the body to its length as one to two nearly; the length from the snout to the branchial aperture, to the total length, as one to four and a quarter. Body covered with scales, which are rhomboidal, occasionally triangular or of an irregular shape, with their surfaces covered with minute, slightly elevated, rounded tubercles, occasioning a rough feel to the touch; they are arranged in obliquely decussating series over the whole head and body, and in parallel series along the bases of the dorsal and anal fins, forming a sort of sheath similar to what has been noted among some of the Scienidæ. Immediately behind the branchial aperture, and above the base of the pectoral, is a series of four or five unusually large plates, which can scarcely be considered as scales. Eyes large, near the facial outline, and slightly in advance of the first dorsal ray; the orbit is 0·6 in diameter. Nostrils oblong, 0·4 in advance of the orbits, and covered by a membrane. Mouth small. Jaws nearly equal, and covered with thin membranaceous lips. Teeth sixteen

in number above and below, and nearly similar in shape and size; the two anterior longest (see figure), prismatic, triangular, emarginate behind, and terminate in points; the posterior teeth short, compressed, with cutting edges which are emarginate, the anterior points becoming more prolonged. Branchial aperture a short and narrow fissure, nearly vertical; placed in front of the superior part of the base of the pectorals.

The first dorsal fin is composed of two, or as others may regard it, of three inequidistant spines. The first is two inches high, stout and subtriangular, immediately above the branchial aperture; broadly channelled behind from the base, gradually contracting to the tip: this spine is smooth on its sides, and roughened with asperities in front. The second spine is 0·7 high, smooth, acute, and contiguous to the first, with which it is connected by a membrane attached to more than two-thirds of its anterior surface. Through inadvertence on the part of the engraver, the figure represents the appearance of another intermediate spine, which is, however, only the posterior outline of the anterior ray. The third spine resembles the second, but is more remote and apparently isolated, being an inch and a quarter distant, or nearly midway between the first and second dorsals; it has a small attached membrane. All these spines lie in a deep groove, which entirely conceals them when recumbent. Second dorsal long, triangular; the first ray half the length of the second; the fourth, fifth and sixth longest; from the fifth, which is 2·5 long, the rays decrease in length, a few of the posterior rays being subequal. Pectorals short and rounded; the base under the second dorsal spine. The pelvic bone terminating in a short and broad spine, truncated at its tip. The spine is hollowed behind, and covered in front and at the tip with irregularly pointed tubercles; the exposed portion is 0·4 long. Immediately behind, and contiguous to this spine, arises what is considered by some writers as the representative of the ventral fin. It is low, and extends to the vent, containing seven short bifid spinous rays. At the base of each ray, on each side, is a short horizontal spine. The anal fin arises underneath the seventh ray of the second dorsal, which it resembles in shape and size; its longest ray is 1·9 in height, and the fin is coterminal with the dorsal. The tail is oblong, narrow in the middle, enlarged at the base of the rays. The caudal fin wide, with a double and broad emargination; the middle rays are distant from each other.

Color. Blackish or dull brown above; lighter on the side. Pupils black; irides greenish.

Length, 12·5; Depth 5·3.
Fin rays, D. 2.1.28; P. 14; V. 7; A. 26; C. 12.

In the year 1820, a specimen was communicated to me from the harbor of New-York. I made a drawing and description of it at the time, but the latter is now mislaid. I then supposed it to be the *maculatus* of Bloch; but if the latter be, as I now suspect, the *capriscus* of recent writers, it cannot be referred to that species. A memorandum on the drawing above alluded to, has the following: "Irides green. D. 3.25; P. 12; A. 24; C. 12."

It is a rare species, and probably that figured by Parra (p. 17, pl. 10), under the name of *Sobaco*.

I have observed no other species of this genus on our coast. The *Balistes sufflamen* of Mitchill (l. c. p. 467, pl. 6, fig. 2), does not exist on our coast. The specimen upon which his description was founded, is in the Cabinet of the Lyceum, and is from the South Atlantic. It has obvious spines along the sides of the tail.

FAMILY OSTRACIONIDÆ.

Body triangular or four-sided, enveloped in a hard bony case, composed of numerous plates, soldered together in such a manner that only the mouth, tail and fins are moveable. No ventral fins. A single dorsal fin.

Obs. A small but well defined group, containing about thirty species.

GENUS LACTOPHRYS.

Body triangular; with strong spines directed backward before the anal fin. Orbits usually spinous.

THE DROMEDARY TRUNK-FISH.

LACTOPHRYS CAMELINUS.

PLATE LVIII. FIG. 190. — (CABINET OF THE LYCEUM.)

Characteristics. Back elevated into a spine. Eight spines along the sides, over the orbits and tail. Length three and a half inches.

Description. Form triangular; the sides compressed, approaching above, and dilated beneath. Abdomen flat, forming an angle with the sides. The whole surface covered with plates of various sizes and shapes, but which may chiefly be resolved into hexagons, with bony ridges from the centre of each plate, radiating to the angles; on the abdomen, these are most obvious. On the sides, the surface of the plates granulate; the plates become smaller and more confused about the head. An indistinct ridge from the orbits to the supra-caudal plate, seems to indicate the position of the lateral line. Head rather suddenly declivous to the snout, which is small and prominent over the jaws. Orbits very large, and distant a diameter apart. Orbits elevated into granulated crests, terminating in an elevated spine over each, which is directed backward. Mouth small, and armed with about twelve long equal teeth. Branchial aperture a vertical slit. Back much compressed, and regularly attenuated above into a flat smooth spine, directed backward. The angular sides of the abdomen are furnished each with four flat spines, directed backward; the first arises under the pectoral fin, is short, and contiguous to the second; the remainder equidistant, and directed horizontally backward. The bony coat of mail terminates over the tail, in two

granulate elongate processes above and beneath the tail; the upper obtusely pointed, the lower broader and rounded.

The dorsal fin higher than broad, arising on the posterior declivity of the dorsal hump. Pectorals placed low down, with its superior rays longest. Anal fin posterior to the dorsal, and nearly in the centre of the infracaudal plate. The vent lies just anterior to the base of this fin. Caudal fin long, rounded, and fan-shaped.

Color. Ashen grey, with irregular black blotches on the dorsal hump and the sides. Abdomen soiled yellowish white.

Length, 3·5. Extreme height, 1·5. Extreme width of abdomen, 1·6.
Fin rays, D. 9; P. 10; A. 10; C. 6.

I know nothing of the origin of this species, except that it is said to have been taken on the shore of Long island. It is possibly the species named *triqueter* by Dr. Smith, and which he represents as "inhabiting the vicinity of Long island, New-York, but rarely makes its appearance so far to the north as Massachusetts, unless driven on shore by the violence of storms." The *triqueter* of Artedi, however, has no spines. It bears a considerable resemblance to the *O. turritus* of Forshal, from the Red Sea; but that species is quadrangular.

YALE'S TRUNK FISH.

LACTOPHRYS YALEI.

Chapin. PARRA, Des. diff. piezas, &c. p. 31, pl. 17, fig. 1.
O. bicaudalis? SMITH, Nat. Hist. Massachusetts, p. 123, fig.
Ostracion yalei. STORER, Boston Jour. Nat. History, Vol. 1, p. 353, pl. 8.
O. id., Yale's Trunk-fish. ID. Report on the Fishes of Massachusetts, pl. 177.

Characteristics. No orbital spines. Back elevated, but not spinous. One spine on each side of the abdomen. Length fourteen inches.

Description. Body covered with hexagonal plates, each with six raised lines. Two subcaudal (lateral?) spines, short, stout, smooth, and somewhat incurved. Back of the dorsal fin a large isolated plate, three quarters of an inch long, composed of portions of the several plates, separated from the rest of the horny cuticle by a continuation of the ligamentary substance in which is imbedded the fin. Surface of the plates granulated. Mouth, large, prominent, armed with large strong teeth. Eyes large, and distant 1·5 from the mouth. Nostrils less than a quarter of an inch in front of the eyes.

Color. Light lurid above; the space between the dorsal and caudal darker. Abdomen white.

Length, 14·0.
Fin rays, D. 10; P. 12; A. 10; C. 10.

This large species was found alive on the shore of Martha's Vineyard, Massachusetts.

For the above description, I am indebted to Dr. Storer. It will undoubtedly be found in our waters.

The *Ostracion sex-cornutus*, or *Six-horned Trunk-fish*, which appears in Dr. Mitchill's Supplement to his Memoir on the Fishes of New-York, was brought from the Gulf of Mexico. It belongs to this genus.

The *Shagreened Ostracion*, noticed by Pennant as occurring off the coast of New-England, is not sufficiently described to enable us to indicate with any certainty the species.

SUB-CLASS II. CARTILAGINOUS FISHES.

Bones cartilaginous. Cranium divided by indistinct sutures. Gills generally fixed; the membrane without rays. Maxillary and intermaxillary bones either wanting or rudimentary, the palatines or vomer alone supplying their place.

Obs. The fishes of this sub-class form a small group, neither superior nor inferior to the others, but form with them a parallel series. The skeleton contains no bony fibres, but calcareous grains. The gelatinous substance, which in other fishes fills the intervals of the vertebræ, and communicates from one to the other only by a small hole, forms in several genera a continuous cord which perforates them all.

ORDER I. ELEUTHEROPOMI.

Gills pectinated, free as in ordinary fishes, with one large external aperture on each side, furnished with a strong opercle; without rays. Upper jaw formed by the palatine bone, firmly united to the maxillary; intermaxillary rudimentary.

FAMILY STURIONIDÆ.

Body elongated, with large osseous plates or tubercles arranged in longitudinal rows. Mouth placed beneath, very protractile, and without teeth.

Obs. A small group, containing at present about fifteen species, but not thoroughly examined.

GENUS ACIPENSER. *Linneus.*

Snout prominent; nostrils and eyes lateral. Four pendent barbels on the under side of the snout. Air-bladder large, and communicating by a large hole with the stomach. Dorsal and anal on the posterior part of the body.

THE LAKE STURGEON.

ACIPENSER RUBICUNDUS.

PLATE LVIII. FIG. 191.

Acipenser rubicundus. LESUEUR, Trans. Am. Phil. Soc. New series, Vol. 1, p. 388, pl. 12.
A. id., The Ruddy Sturgeon. RICHARDSON, Faun. Bor. Am. Vol. 3, p. 284.
A. id. KIRTLAND, Report on the Zoology of Ohio, p. 196.

Characteristics. Body of a ruddy hue. Head flat between the eyes. Lateral series lozenge-shaped, oblique, and thirty-nine in number. Length four feet.

Description. Body most elevated at the nape. Head flat, obliquely descending to the end of the snout, and covered with rough radiated bony plates. Eyes round, with a vertical pupil, and three inches apart, and the same distance from the end of the snout. Four barbels arranged transversely under the snout, and nearer the snout than to the mouth. Dorsal series of tubercles nine in number, broad, flat, little elevated; the two posterior ending in a point. The lateral series composed of thirty-nine lozenge-shaped oblique plates, equidistant between the dorsal and abdominal outlines, and running upon the tail; rudiments of plates behind the dorsal fin. Opercle radiated; small plates behind the eyes, extending along the borders of the snout; a semicircle of small tubercles below the eyes. Skin covered with minute prickles in patches, which are obvious to the touch. Tail covered with lozenge-shaped tubercles. The dorsal fin wider than high, broadly excavated; with its posterior two-thirds above the base of the anal. Pectorals long and pointed, with numerous rays. Anal higher than wide; its posterior margin vertically truncate, slightly concave. Caudal fin stout.

Color, of the back, yellowish red; of the sides, olivaceous red.

Length, 48·0; of the head, 6·0.
Fin rays, D. 40; P. 50; V. 28; A. 22.

Lesueur, who first described this species, has noticed two varieties. The first has the head flat and shorter, with twelve dorsal and thirty-four lateral tubercles; length twenty-nine inches. The second variety occurs in the Ohio; the head convex; dorsal tubercles oblong, and fourteen in number; the lateral tubercles thirty-four, irregularly formed and placed; length four feet.

This species occurs in Lakes Ontario, Erie, and all the upper lakes. Dr. Richardson states the northern limits of the Sturgeon in North America, to be about the fifty-fifth parallel of north latitude.

THE SHORT-NOSED STURGEON.

ACIPENSER BREVIROSTRIS.

The Round-nosed Sturgeon, A. sturio. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 461.
Acipenser brevirostrum. LESUEUR, Trans. Am. Phil. Soc. New Series, Vol. 1, p. 590.

Characteristics. Snout short and blunt. Dorsal series of tubercles nine to twelve; lateral series twenty-three to twenty-nine, oblong, oblique. Length two to five feet.

Description. Head large and convex. Snout short, subacute, depressed between the eyes. The skin appears smooth, but is covered with small spinous asperities, scattered equally over the skin. Auricular orifices an inch and a half behind the eyes. Length of the head to the total length as one to five. Four flat barbels under the snout, disposed in pairs, and nearer the nostrils than to the end of the snout. The dorsal series composed of nine oblong radiated and carinated tubercles, with another at the base of the dorsal fin. Lateral series twenty-three to twenty-nine, irregular, oblong, oblique, with a slight keel on the posterior ones. Ab-

dominal series varying from five to seven, and often unequal in number on the two sides. Tail covered with lozenge-shaped plates.

Color. Dusky above, with faint traces of oblique bands. Whitish, and often with a reddish hue below the lateral series. Belly white. Fins tinged with reddish.

Dr. Mitchill, who first noticed this Sturgeon, supposed it to be identical with the *sturio* of Europe, and therefore gave a slight and scarcely recognizable notice of this species. The short description given by Lesueur agrees in the main with our Hudson river species, but I regret that I have not had an opportunity of giving it a thorough examination.

We know little of the range of this species. It is not mentioned in the able Report on the Fishes of Massachusetts. I have seen it, or a closely allied species, in the markets at Norfolk (Virginia).

THE SHARP-NOSED STURGEON.

ACIPENSER OXYRHINCUS.

PLATE LVIII. FIG. 189. YOUNG.

The Sharp-nosed Sturgeon, A. oxyrhincus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 461.
Acipenser idem. LESUEUR, Trans. Am. Philos. Soc. (New Series), Vol. 1, p. 394.
The Sharped-nosed Sturgeon, A. id. STORER, Report on the Fishes of Massachusetts, p. 178.

Characteristics. Snout elongated, spatuliform, and covered with strong bony shields. Length two to seven and eight feet.

Description, from a specimen eighteen inches long. Body pentagonal. Skin rough, and under the lens appearing minutely aculeated. Head flattened above; slightly depressed between the eyes. Snout produced horizontally, attenuated and rounded at the tip, and covered with strong bony shields roughened above and beneath. The dorsal series largest, and composed of nine distinct radiated tubercles, elevated into sharp spines pointing backward. At the anterior base of the dorsal fin, another tubercle, but not so elevated, nor is it pointed; the central tubercles of this series largest. Lateral series composed of twenty-five radiated, carinated, angular, saddle-shaped tubercles, largest about the middle of the body, and gradually decreasing to the tail. Abdominal series of eight angular tubercles, nearly of equal size. Between the vent and the anal fin are four plates, and the same number between the dorsal and base of the caudal. Eyes moderate, nearly equidistant between the end of the snout and the base of the pectorals. Nostrils double, anterior to the eyes; the inferior pair more than twice the size of the other. Under the snout are two pair of short and slender barbels, midway between the mouth and the tip of the snout. Mouth beneath, transverse, purse-shaped, with thick folded lips, and very protractile. Opercle radiated. The dorsal fin arises anterior to the origin of the anal; its first ray highest, and longer than the base of the fin, deeply concave on its margin; its posterior ray attached by a membrane to the body. Pectorals short and obtusely pointed; its eighth and ninth rays from above, longest. Ventrals short, distant, and placed under the fourteeth and fifteenth tubercle of the lateral series. Anal pointed; the

central rays longest; its tip reaching the lower base of the caudal. Caudal fin with its upper lobe elongated.

Color. Dark olive-grey above, occasionally brownish; beneath light ash-grey. Fins often red from infiltration. Pupils black; irides golden yellow.

Length, 18·0.

Fin rays, "D. 38; P. 28; V. 24; A. 23; C. 125" (*Lesueur*).

This species appears to grow to a larger size than the preceding. The greatest differences in the characters of the old and young appear to consist in the variable number of the tubercles. It would belong to the genus *Helopes* of Brandt, which is thus characterized: "Snout "long (one sixth or seventh the length of the body), and body covered with strong bony dis- "tant shields." It forms a palatable food.

(*EXTRA-LIMITAL.*)

A. transmontanus. (Richardson, l. c. p. 278, pl. 97.) Profile shelving off suddenly before the nostrils, into the greatly depressed and slightly upturned, moderately acute snout, which, measured from the orbits, is $\frac{1}{12}$ of the total. *Columbia River.*

A. rupertianus. (Id. l. c. p. 311, pl. 97.) Snout narrow, not acute; its sides flattened; its vertical height equal to half the transverse breadth. D. 40; P. 40; C. 112. Length two feet. *Northern Regions.*

A. maculosus. (Lesueur, l. c. Vol. 1, p. 393.) Snout much elongated. Color reddish olive, with black spots. Length six to eighteen inches. *Ohio River.*

Genus Platirostra, *Lesueur.* Jaws, tongue and throat without teeth. Snout long, flattened and spatuliform. Body without plates. Tail only covered on each side by small bony plates.

P. edentula. (Lesueur, Ac. Sc. Vol. 1, p. 228; Say, App. Long, p. 254.) Snout not so long as one-third of the body, dilated and rounded at its end. Opercle long and pointed. D. 58; P. 26; C. 15.84 = 99. Length three to four feet. A specimen in the Albany Institute, from Juliet, Illinois.

ORDER II. PLAGIOSTOMI.

Gills fixed by their external edges, with five small external openings on each side. No opercle. Jaws represented by the palatine and postmandibulary bones, which alone are armed with teeth. Pectorals and ventrals always present; the latter (in the male) furnished on their internal margins with long appendages.

FAMILY SQUALIDÆ.

Body elongated, cylindrical. Tail thick and muscular. Eyes lateral. Branchial openings on each side, never underneath.

Obs. About eighty species have been described, belonging to this family.

GENUS CARCHARIAS. *Cuvier.*

Snout depressed; the nostrils beneath the middle. Teeth cutting, pointed, and generally denticulated at the sides. First dorsal far in advance of the ventrals; the second nearly opposite to the anal, which is always present. No temporal orifices; the last of the branchial openings above or slightly in front of the pectorals.

THE THRESHER SHARK.

CARCHARIAS VULPES.

PLATE LXI. FIG. 199. FEMALE.—(AMERICAN MUSEUM.)

Long-tailed Shark. PENNANT, Br. Zoology.
Thresher. MITCHILL, Medical Repository, Vol. 8, p. 77, figure. (Male.)
Squalus vulpes, Thresher or *Long-tailed Shark.* ID. Lit. and Phil. Soc. Vol. 1, p. 482.
Carcharias vulpes. CUVIER, Règne Animal, Vol. 2.
C. id., Fox Shark, Thresher. STORER, Report on the Fishes of Massachusetts.

Characteristics. Upper lobe of the tail nearly as long or longer than the body. Length twelve to fifteen feet.

Description. Body cylindrical, thickest before the dorsal fin, with a ridge on its upper surface towards the tail, and a deep cavity at the base of the caudal fin, as if strangulated. Back regularly arched from above the pectorals to the end of the snout, which is blunt. Skin roughened with minute prickles, which are directed backward, and obvious to the touch. Nostrils small and valvular. Mouth in the shape of a horseshoe, with three series of distant, flat, triangular, smooth-edged teeth in each jaw; the teeth appear to be loosely inserted in the

gums. Of the five branchial apertures, the posterior is smallest, and placed just anterior to or slightly over the base of the pectorals. Upper maxillary bone detached from the snout, and moves independently of it.

The first dorsal high and triangular; a foot high, and nearly as long on its base. Second dorsal similar in shape, but much smaller. The pectorals long and wide, emarginated behind, with a small process behind. Ventrals wider than high, and nearest the first dorsal. The male organs arising from between the ventrals. Anal small, and placed behind the second dorsal. Caudal composed of three distinct lobes; one small, triangular, at the under side of the tip of the elongated tail; a second long and low, extending along the upper side of the tail; and a third short and broad, at the lower base of the tail. Vent between the ventrals.

Color. Slate-blue above; beneath soiled white, marked with obsolete bluish spots. Pupils a longitudinal slit, edged with golden. In cabinet specimens, the color above becomes soiled brown.

Length, 12 feet.

This Shark, which appears to be common to both sides of the Atlantic, is known here under the various popular names of *Thresher*, *Fox Shark* and *Swingle-tail*. Its principal organ of defence appears to be its long flexible tail: it assails, and literally *threshes* its enemies. It pursues scholes of mackerel, mossbonkers and shad, and devours them in great numbers. I refer to this species the individual roughly figured and described by Mitchill, although he states inaccurately that the teeth were in a single row.

This species has been noticed on our coast, from New-York to Nova Scotia.

THE SMALL BLUE SHARK.

CARCHARIAS CERULEUS.

PLATE LXI. FIG. 200.

The Small Blue Shark. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 487.

Characteristics. Small. Pectorals broad. Slate-blue above. Teeth small serrated. Length two to six feet.

Description. Body cylindrical; deepest in front of the first dorsal fin. Surface covered with minute, distant and vertically oblong scales; under the lens, these appear as if fluted longitudinally, and are elevated posteriorly, so as to be sensibly rough when the hand is passed towards the head. Eyes rather large, lateral, with a large nictitating membrane. Nose blunt; conical. Nostrils lunate, directed downwards and backward, with a valvular fold of skin beneath, and placed just under the margin of the snout, half way between its tip and the orbits. Teeth in several series, small, triangular, serrate; the interior edges convex. Branchial apertures large, with the central one somewhat longest; the penultimate over the anterior edge of the pectoral, the last over the fin itself.

The first dorsal with a narrow base, rounded in front; its margin concave, and acutely elongated behind. It arises over the posterior part of the base of the pectorals, with its base and extreme height 2·7 and equal. The second dorsal rhomboidal, acutely pointed behind. The pectorals, although rising from a narrow base, may be considered as broad fins; four inches long, with a base of one inch and a half and two and a half inches along the posterior or lower margin. Ventrals small and obliquely truncated, with two pointed appendices beneath, 0·7 long. Anal deeply notched; its upper lobe longest, pointed; the anterior lobe rounded. Tail elongated, six inches long, with two lobes, the spinal column running through it; the upper lobe subequal throughout, slightly enlarged at the tip, and extending a little beyond the vertebræ; lower lobe triangular, two inches high, then suddenly diminishing along the under side of the tail, suddenly enlarging near the tip, and forming a third lobe.

Color. Slate-blue on the upper part of the head, body and superior fins. The same color, but a shade lighter, extends over the upper part of the pectoral and ventral fins. All beneath whitish; occasionally cinereous.

Length, 25·0. Extreme depth, 3·0.

This species is frequently taken in our waters, and along the coast to New-Hampshire. I have altered the name of *glaucus*, as it is the same with that employed by Rondeletius and Yarrel. I should be inclined to consider this and the *obscurus* of Lesueur as identical, were it not for the teeth, which he represents in his plate as having rounded shoulders. They are at all events closely allied species.

THE DUSKY SHARK.

CARCHARIAS OBSCURUS.

PLATE LXI. FIG. 201.

Dusky Shark, Squalus obscurus. LESUEUR, Ac. Nat. Sciences, Vol. 1, p. 223, pl. 9.

Characteristics. Pectorals long, narrow, falciform. Ventrals subquadrangular, with no pointed process behind. Snout flat and rounded.

Description. Head flat and broad; snout sharp-edged, rounded, and wide at the end. Eyes lateral, large, orbicular; pupil transverse, narrow, with a nictitating membrane arising from below. Branchial apertures unequal; the first very large, the last very small, and placed above the origin of the pectoral fin. Nostrils oblique, and partially covered by a short pointed appendage on the margin, near the end of the snout. Tail rounded, strong, with a falciform fin, terminating in a distinct triangular lanceolate lobe. The lower lobe of the fin short and rounded. Tail with a carina, undulated above, and slightly notched at the base. Ventrals small, subquadrangular, without posterior processes.

Color. Dusky, with a white spot on each side of the space between the eyes and pectoral fins.

Length ——.

I am indebted to Lesueur for the description and figure of this species. There are certain particulars in which they do not agree, but I suppose the description to be the most exact. It bears a general resemblance to the following, from which, however, it is obviously distinct.

THE GROUND SHARK.

CARCHARIAS LITTORALIS.

The Ground Shark, Squalus littoralis. MITCHILL, Am. Month. Mag. Vol. 2, p. 328.
Ash-colored Shark, S. littoralis. LESUEUR, Jour. Ac. Nat. Sc. Vol. 1, p. 224.

Characteristics. Fins large, not prolonged backward. Teeth narrow, pointed, undulated. Second dorsal before the anal. Length five to eight feet.

Description. Body short, thick, wider towards the abdomen. Head flat, dilated between the eyes, and terminating in a pointed snout, rounded at the end. Nasal lobes very short; apertures pretty wide, and laterally placed at the extremity of the snout. Eyes very small, orbicular, brilliant; these are somewhat above the sides of the snout. Branchial apertures very large, especially the first; the last much smaller, embracing the base of the pectoral fin. Dorsal subquadrangular; pectoral soft. Tail rounded, tapering to a point, and furnished with a falciform fin, terminated by a distinct triangular lobe. It has an undulated carina, tapering at the base upwards. The opening of the jaws represents the letter U. Teeth long, in three or four rows, without dentulures.

Color. Reddish ash-grey. Abdomen white. Irides silvery.

Length three feet. New-York markets.

To this description, which is taken from Lesueur, I add the following additional remarks by Dr. Mitchill:

"Mouth enormously wide, and not very remote from the snout; with three rows of elon-"gated teeth, shaped almost like horseshoe nails. Tongue broad and smooth. The hindmost "spiracle measurably in advance of the pectorals, opening behind the eye. Skin rough "when felt reversely. Length five to eight feet. Color whitish or grey."

It will be observed that this shark has some of the characters of a *Lamna;* but I cannot venture to reconcile the discrepancies between the two descriptions, which, it is worthy of notice, were made from the same specimen.

GENUS LAMNA. *Cuvier.*

Snout pyramidal, with the nostrils under the base. Branchial apertures all in front of the pectorals. Temporal orifices wanting.

Obs. Some of the recent English systematic writers have added to these characters, the following: "First dorsal in advance of the pectorals, and sides of the tail carinated." We prefer the less restricted characters assigned to this genus by Cuvier.

THE MACKEREL PORBEAGLE.

LAMNA PUNCTATA.

PLATE LXIII. FIGS. 206 & 207. — (CABINET OF THE LYCEUM.)

The Green-backed Shark, Squalus punctatus. MITCHILL, Trans. Lit. and Phil. Soc. Vol. I, p. 483. (Young.)
Lamna punctata, Mackerel Shark. STORER, Massachusetts Report, p. 185, pl. 3, fig. 2.

Characteristics. Teeth in front long and sinuous; behind, triangular, and all with smooth edges. Anal small, and posterior to the second dorsal. Tail with a keel on its sides; lobes not greatly unequal. Length four to eight feet.

Description. Body cylindrical, fusiform. Head small, with a blunt pyramidal snout six inches long, measured from the nostrils. The surface, under the lens, exhibits numerous minute plates, each with three parallel longitudinal elevated lines, producing a roughness when the hand is moved towards the head. A carina on each side of the tail, about two feet in extent, highest in the middle; a deep indentation on the upper and lower sides of the tail, in the shape of a horseshoe. On the surface of the head are four series of punctures on each side, commencing nearly opposite to the posterior margins of the orbits, dilating and extending to within about an inch of the extremity of the snout. Immediately before the eyes is a large patch of similar punctures, which extend slightly beyond the nostrils; on the under side of the snout is a triangular patch of similar punctures, extending to within 0·7 of the extremity; a regularly curved series of punctures from the end of the carina, concurrent with the back, and ending just anterior to the origin of the first dorsal fin. All these punctures are the apertures of mucous ducts, which are filled with a transparent jelly. The skin, at the posterior base of the dorsal and pectoral fins, was eroded by some parasitical animal. (Dr. Storer noticed the *Anthosoma smithii* on his specimen.) Eyes moderate, lateral 2·3 in diameter, and eight inches distant from each other. Nostrils doubly curved, sublateral. The posterior branchial aperture farthest from its antecedent.

Teeth, of various shapes and sizes, disposed in from three to five rows. In the lower jaw, the front teeth (see figure 206, 4) are largest, 0·9 long measured to the space between the roots, irregularly lanceolate, the external and sometimes the internal edge rounded and waved; the margins with a finely elevated crest, which is smooth, obsoletely serrate under the lens; flattened in front, and rounded, approaching a triangular form behind; occasionally they are

recurved, the tips turning slightly outwards. The front teeth of the upper jaw (fig. 206, 3) long and pointed, flattened on their anterior surfaces, rounded behind. Teeth on the sides of the jaw (fig. 206, 4) small, compressed, triangular, and so much crowded behind as almost to resemble tuberculated molars. On the palate is a rounded patch, which offers asperities to the hand when moved forward. Across the roof of the mouth, a strong membranous fold.

The first dorsal fin quadrilateral, higher than long; its upper margin excavated; its lower angle pointed. It arises 43·0 from the point of the nose; base 14·0; height in front 16·0. The second dorsal very small, oblong, its lower angle behind ending in a prolonged point 3·0 long; it arises thirty-eight inches behind the first dorsal, and has a base of 1·3; the height of its broad anterior part, 2·5. Pectorals long, pointed, deeply concave on the posterior margin, with a small base; they are twenty-eight inches long, with a base of twelve inches. The ventrals are forty inches behind the pectorals, which are quadrilateral, and the length of the base twice the height. Anal fin small, similar in shape to the second dorsal, and slightly posterior to it, midway between the ventral and base of the caudal. Caudal fin deeply lunate, with slightly unequal lobes, the upper measuring twenty-five and the lower twenty-one inches; the tips three feet apart.

Color. A general dark slate; lighter beneath. When first taken from the water, it is said to be of a deep bottle-green. Tongue mottled with black.

Length ten feet two inches.

This was an unusually large specimen, taken in the harbor of New-York, October, 1840. The description and dimensions of the teeth are from a head of rather smaller size, communicated to the Lyceum about sixteen years since by Capt. Barnard,* and taken by him near the light-ship stationed off Sandy Hook.

This species receives its popular name of *Mackerel Shark*, from its being frequently observed in pursuit of that fish. Its liver produces a large quantity of oil, which is highly esteemed by curriers. It is allied to the *Porbeagle* of Europe, and appears to be more numerous on the coast of Massachusetts than in our waters.

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* I take this opportunity of recording my thanks to this individual for his attention in securing many valuable species, and for the accompanying memoranda. Capt. Barnard is well known in this community, by his almost unparalleled sufferings among the Falkland islands. He was cruising among those islands for seal, when he discovered a shipwrecked English vessel on the coast. He hastened to its relief, and succeeded in rescuing forty-seven persons, when they forcibly took possession of his vessel, and carried her to England, basely leaving Capt. Barnard and two of his crew to encounter the rigors of an antarctic winter on a desolate and uninhabited island. He remained there two years, suffering at times the horrors of famine, when he was accidentally discovered and taken off. He has left a curious account of his sufferings, under the title of "Narrative of the Sufferings and Adventures of Capt. Charles H. Barnard." New-York, 1829, pp. 296.

THE LONG-TAILED PORBEAGLE.

LAMNA CAUDATA.

PLATE LXII. FIG. 205. *a.* UNDER SIDE OF HEAD; *b.* A TOOTH.

Carcharias terræ-novæ? RICHARDSON, F. B. A. Vol. 3, p. 289. (Young male.)

Characteristics. Upper caudal lobe much elongated, and furnished with an accessory lobe at the tip. Teeth triangular, serrated. No caudal carina. Length three to six feet.

Description. Body more elongated and cylindrical than in the preceding. Surface roughened to the touch, when the hand is moved towards the head. Snout prominent, pointed, broad, thin, and of a firm consistence. Eyes small, lateral, oval. Nostrils small, and beneath the snout. Mouth large (fig. *a.*), susceptible of great dilatation, crescent-shaped, and armed with four or five series of triangular teeth (fig. *b.*), serrated on their edges; the largest were six-tenths of an inch long. Branchial apertures admit the passage of two fingers, and all are anterior to the base of the pectorals. The first dorsal fin triangular in its general shape, quadrilateral, one foot high, widely and regularly concave on its upper margin, rectilinear along its posterior margin, and pointed; it is twelve inches from its anterior base to its posterior tip; arises over about the middle of the base of the pectorals. Second dorsal small, 0·3 high, with a base half an inch long; placed over the anal. Pectorals eighteen inches long, pointed, triangular, with a base of ten inches. Ventrals small, nearer the anal fin than to the pectorals, of a very firm texture, emarginate beneath, and terminating in a long point behind. The vent lies between them. The anal similar in size and shape, and beneath the second dorsal. Caudal fin with a deep indentation at its base. The upper lobe two feet long, and furnished with a dilated fin near its tip; the lower lobe ten inches long. All the fins, with their posterior edges, thin and ragged.

Color. Uniform dusky hue above, tinged with bluish, and forming a bluish grey; lighter colored on the sides of the head and body; white beneath. Irides greenish blue.

Length seven feet four inches. Weight one hundred and sixty-one pounds.

I am indebted to Mr. Carson Brevoort, of this city, for the drawing which illustrates this species. He captured it in September, at Brenton's reef on the coast of Rhode-Island; and although I have seen several specimens of the young from this harbor, this is the first adult specimen of which I have been able to obtain a good figure. The position of its first dorsal, and its unequal lobed tail, is a new form under this genus. It clearly cannot, from the position of its branchial apertures, be arranged under *Carcharias*. In many particulars, it is nevertheless closely allied to the *C. ceruleus* previously described. When captured, the stomach was filled with large fish; too much injured, however, to determine the species.

GENUS MUSTELUS. *Cuvier.*

Teeth blunt, forming a closely compacted pavement in each jaw; with temporal orifices. First dorsal in advance of the ventrals. Lower lobe of the caudal short. No spines.

THE AMERICAN HOUND-FISH.

MUSTELUS CANIS.

PLATE LXIV.—FIG. 209.

Dog-fish, Squalus canis. MITCHILL, Trans. Lit. and Phil. Soc. Vol. I, p. 486.

Characteristics. Unspotted; dull ash grey. Upper edges of dorsals and anal bordered with black. Length two to four feet.

Description. Body slender, cylindrical, tapering, elongated. Head flattened above; snout thin, obtusely pointed. Surface of the body like shagreen when rubbed forwards, and appears under the lens to be composed of acute spinous plates. Lateral line scarcely obvious, nearer the back than to the abdomen. On the back, at a point above the origin of the pectoral fins, is a slightly elevated ridge, only interrupted by the fins, and extending to the origin of the caudal fin. The two posterior branchial apertures over the base of the pectorals; the fourth longest, the fifth shortest, and subequal with the first. Temporal orifices circular, about 0·2 in diameter; they lie in a fossa, and are distant 0·3 from the posterior angle of the eyes. Eyes oblong, lateral, 0.45 above the angle of the jaws; vertical diameter 0·4, transverse diameter 0·7. Nostrils large, semilunar, on the underside of the snout, and midway between the angles of the mouth and the tip of the snout. Anterior margin with a large and loose triangular process, and a small one external to it; attached to the external side, and to the lower part of the anterior margin, is a second stout process, with a small membranous appendix; another process, longer than the preceding, is attached to the inside of the posterior margin. When these several valvular processes are put aside, we are enabled to observe the curiously pectinated nasal apparatus. A series of minute punctures originate a short distance before the branchial openings, and terminate 0·5 behind the nostrils. Similar punctures (the openings of mucous ducts) are observed to be irregularly distributed on the under side of the head, anterior to the mouth. The mouth crescent-shaped when opened, triangular when closed. Upper lip elongated, free; lower lip convoluted. Teeth on the jaws, smooth, flattened, rhomboidal, distributed in about ten rows; the posterior edge of each tooth slightly elevated, so as to produce a distinct roughness when the finger is drawn forward. Tongue moderately free, thin and rough; its form subtriangular, obtusely truncated at the tips.

Both dorsal fins nearly of the same shape; the first 3·5 high, its base 2·5, quadrilateral, excavated behind, with an elongated point behind; its origin is eight inches from the end of the snout, and slightly behind the base of the pectoral fins. Second dorsal smaller, and arising seventeen and a half inches from the point of the snout; it is 2·7 high, with a base

of 2·3. The pectorals with a narrow base, 3·5 long, and dilate to a wide margin. Ventrals quadrangular, slightly emarginate behind, and placed under a point nearer to the first dorsal than to the second. The anal similar in shape, but smaller than the second dorsal; placed under the posterior part of that fin, and extends a short distance beyond it. The caudal fin composed of two portions, so distinct that Mitchill has described the lower lobe as a second anal. The upper lobe long and narrow, gradually rising into a rounded lobe at the end of the vertebræ. Lower lobes two; the anterior high before, emarginate and gradually declining behind, its margin being festooned; the posterior lobe triangular, closely connected with the preceding, and, with the upper lobe, is obliquely truncated at the tip.

Color. Uniform dull ashen grey (plumbeous in dried specimens); white beneath. Upper edges of the dorsals and anal bordered with black, (this is most distinct in young individuals.) Ventrals and anals opaque white; the lower lobes of the caudal bordered with white in the young, and greyish in the adult. Irides greenish yellow.

Length, 28·0.

This small species, which, according to Dr. Mitchill, is sometimes four feet in length, is not uncommon on the coast of New-York. I have taken them not more than fifteen inches long, and the largest I have seen did not exceed three feet. They are called *Dog-fish* by the fishermen, who usually confound under the same name this and another species. I have usually found their stomachs filled with the smaller crustaceous animals, and with seaweed. It is very distinct from the *M. lævis* of Europe, and also from the *M. hinnulus* of Blainville, if the latter be indeed a distinct species. It is not mentioned among the fishes on the coast of Massachusetts, but very probably will be found to exist on that coast. I have received it from Rhode-Island.

GENUS SELACHUS. *Cuvier.*

Branchial apertures all before the pectorals, long, and nearly surrounding the neck. Teeth small, not denticulated, of various forms, for the most part conical.

Obs. This genus comprises at present but one well determined species, which has been reproduced under different names.

THE BASKING SHARK.

SELACHUS MAXIMUS.

PLATE LXIII. FIG 208. (MALE.)

Squalus maximus. LINNEUS.
S. peregrinus. BLAINVILLE, Ann. Mus. Vol. 18, pl. 6, fig. 1.
Squalus maximus, Basking Shark. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 486.
S. elephas. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 2, p. 343, pl. 11.
S. maximus. RICHARDSON, Faun. Bor. Americana, Vol. 3, p. 291.
S. (Selache) maximus. STORER, Massachusetts Report, p. 407.

Characteristics. Dark slate. Tail with a carina on each side. Length exceeding thirty feet.

Description. Body cylindrical, fusiform. Surface with numerous wrinkles, and covered with minute sharp prickles, distributed in small groups, and producing a roughness in the direction of the head. Head small. Snout smooth, blunt, and furnished with numerous circular and oblong mucous pores. Temporal orifice very small, and placed just over and behind the angle of the jaws. Eyes very small, not exceeding three inches in diameter, and placed on the margin of the upper jaw. Branchial apertures with the posterior pair smallest, the anterior nearly meeting beneath. The nostrils anterior to the eyes, on the edge of the upper lip. Teeth in the upper jaw, of various forms, recurved, edged but not serrated, subconic, triangular-conic and even bifid, in six rows; in the lower jaw, with seven rows, rather larger, sublanceolate, conic, elongate; (according to Dr. Storer, fourteen hundred in the lower jaw alone.)

The first dorsal fin triangular, concave behind, about four feet high, pointed behind. The second arises six feet behind the first; small, sixteen inches high; its origin anterior to the anal, and pointed behind. Pectorals large, falciform, and five feet and a half long, with a base of nearly two feet. Ventrals subtriangular, and nearly equidistant between the first and second dorsal, with a base of nearly two feet. Male organs about three feet long, and cylindrical. Anal fin three feet behind the vent, subtriangular, with a pointed process behind. Tail with a strangulated appearance above, and below at the base of the caudal, and an elevated keel on its sides nearly two feet long. The caudal fin with unequal lobes; the uppermost six feet long, with a small triangular fin near the tip; the lower lobe shorter, four feet long, and wide.

Color. Dark-slate or leaden above; lighter beneath.

Length 32 – 33 feet.

This species inhabits the northern seas, and occasionally visits our coast in summer. His large size, and his habit of swimming near the surface, with his upper jaw projected out of the water, as he moves with open mouth in pursuit of his prey, has suggested to ignorant credulity the idea of some huge aquatic monster, which has received the name of *Sea Serpent.* In 1822, an individual was captured in the lower harbor of New York, and subsequently described by Lesueur, whose figure we have partly copied, with some alterations from a drawing which we made from the same specimen. In 1828, another but smaller individual was exhibited here from the State of Maine, and described by Dr. Mitchill under the name of *S. rhinoceros,* in the newspapers of the day. The popular description of this animal, cited below,* and which appeared in print, exhibits the natural tendency to the marvellous in relation to all large and rare marine animals.

The *Basking Shark* has obtained its popular name from its habit of basking, or remaining quiet for a length of time in one place. It is called *Shark* by our fishermen. It is sluggish and inert, without any of the ferocity of its congeners.

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* "This nondescript, when taken, was twenty-eight feet long and sixteen feet in circumference, and was computed to weigh twenty tons. His nose projects abruptly from the upper part of his head like an anvil! is about the size of a two gallon jug; and when seen above the water, resembles a snake's head. When extended, his mouth admits a puncheon endwise, and was surrounded by cartilaginous lips, studded by several rows of small teeth. His nostrils resemble those of a horse! and his eyes, when taken, were a foot in circumference. At the junction of the head and body, on each side, are two valvular segments nearly encircling the animal, and provided with a fringe resembling whalebone, which appear to have answered the purpose of gills. His fins are seven in number, broad and pointed; the two back fins are four or five feet high, and when the monster was first discovered on the surface of the water, resembled two waves rolling in succession! From and between the anal fins, two legs project five feet in length, and are terminated by a claw tipped with horn! His tail is of a semilunar form, four and eight feet across in perpendicular height. His skin is in color like the elephant! and is rough and mailed like that of the rhinoceros!"

GENUS SPINAX. *Cuvier.*

A sharp robust spine in front of each of the two dorsals. Temporal orifices. No anal fin. Teeth in several rows, small and cutting. First dorsal in advance of the ventrals. Branchial apertures all in front of the pectorals.

THE SPINOUS DOG-FISH.

SPINAX ACANTHIAS?

PLATE LXIV. FIG. 210.

Spinax acanthias, Picked Dog-fish. STORER, Massachusetts Report, p. 187.

Characteristics. Slate-color above; dull white beneath. Upper lobe of the tail subtruncate behind. Length one to three feet.

Description. Body elongated, cylindrical. Snout produced, subconic, flattened above, and in the living fish translucent. Surface with asperities directed backwards. A slightly elevated line on the back between the dorsals, and becoming effaced on the nape. Lateral line nearly medial, straight, but sinuous on that portion of the tail included between the lobes and the caudal. Eyes large, oblong. Temporal orifices large, and closed from before by a strong cartilaginous valve; they are placed a short distance behind the eyes, and in the plane of the upper margin of the orbits. Nostrils double, transversely beneath the snout, and rather nearer the eyes than to the tip of the snout; the internal largest. Mouth, when closed, semi-circular; when expanded, nearly round. Three rows of small trenchant triangular teeth in the upper jaw, with smooth edges; two rows in the lower jaw, of similar teeth, and the rudiments of a third exterior row: the points of all the teeth diverge from the centre of the jaw outwardly. Numerous mucous orifices about the head and snout. Length of the head, measured to the first branchial aperture, to the length of the body, as one to six and a half nearly.

The first dorsal broad and quadrilateral, convex in front, slightly concave on its upper margin, straight on its posterior margin, pointed, and almost parallel with the line of the back. Imbedded in its anterior base is a robust slightly recurved spine, about two-thirds of the anterior height of the fin, white at the tip, and transversely striate with umber at the base. The second dorsal, which arises on the anterior part of the posterior third of the animal, is smaller than the first, but similar in shape with the upper margin, more deeply excavated above, and finely pointed behind; the spine on its anterior portion, longer than the first, and nearly equal in height to the anterior part of the fin. Pectorals large and long, placed low down; its tip receiving a point nearly beneath the first dorsal spine. Ventrals quadrilateral, arising midway between the termination of the first and the commencement of the second dorsal, concave. Caudal fin with unequal lobes; the upper elongated, broad, subtruncate at the extremity; the lower short and rounded.

Color. Slate above; rather darker on the summit of the head; lighter beneath the lateral line. ("Under the lateral line, a series of white circular spots." *Storer*.) Abdomen white with a pinkish hue, and passing into bluish grey towards the tail. In several specimens the ventrals were reddish, which may be attributed to infiltration.

This species, which is exceedingly common on our coast, does not occur in Dr. Mitchill's enumeration of the Fishes of New-York, nor in his Supplement to this Memoir. He was acquainted, however, with the species; for I find a notice of it in one of the ephemeral papers a few years afterwards. In this paper, he states that the greater part of those taken in December were females in a gravid state. They are so numerous about Cape Cod, according to Dr. Storer, that they form in the spring and autumn an important fishery for the oil which they furnish. In Scotland, they are eaten by the poorer classes. They are very voracious. The œsophagus and anterior third of the stomach is furnished with long white papillæ, the remainder with brown longitudinal folds. In the stomach of several, I found remains of the *Mya arenaria*, and scales of fishes. They are true scavengers of the sea. I am almost inclined to suspect our species distinct from that of Europe, but I have not any opportunity of making a direct comparison. An English naturalist, Couch, asserts of this species, that it bends itself into a bow, for the purpose of using its spines; and by a sudden motion, causes them to spring asunder in opposite directions; and so accurately is this intention effected, that if a finger be placed on its head, it will strike it without piercing its own skin.

The Spinous Dog-fish does not extend, as far as I have been able to ascertain, very far south of the coast of New-York. Northwardly it extends beyond the coast of Labrador.

GENUS SCYMNUS. *Cuvier.*

Teeth in two or more rows; in the upper jaw lanceolate, with the cutting edges rough; in the lower jaw pyramidal, compressed, and with the cutting edges crenated. Temporal orifices. Anal wanting. No spines before the dorsal fin.

Obs. I refer to this genus, a species of Shark described by Lesueur, on the coast of Massachusetts, and referred to an illy constructed genus *Somniosus*.

THE NURSE.

SCYMNUS BREVIPINNA.

PLATE LXI. FIG. 202.

Somniosus brevipinna, Nurse or *Sleeper.* LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 222, plate.
S. id. STORER, Massachusetts Report, p. 189.

Characteristics. Fins exceedingly small. Lateral line black, undulating near the head, and marked by small transverse lines. Length six feet and a half.

Description. "Body elongated, with a slight elevation, and narrow at the tail. Spiracles "distant from the eyes, and more elevated. Eyes small, round, and situated laterally. Snout "short, obtuse. Branchial apertures small, and anterior to the pectorals. Pectoral fins larger "than the others, except the caudal; four inches at the base, and at most five inches long. "Teeth ——. The first dorsal midway between the pectoral and anal [ventral ?] fins; the "second a little farther than the ventrals and both very near the tail. Skin rough, beset with "triangular, curved, striated and pointed asperities. *Color*, of the entire body, pale lead grey, "somewhat darker on the back."

This very brief and unsatisfactory notice by Lesueur, indicates a new form among the Squalidæ, hitherto unobserved on our coast. It occurred at Marblehead on the coast of Massachusetts, and it is inserted here with a view of directing the attention of our naturalists to the subject. At Marblehead, the fishermen, according to Mr. Lesueur, call it *Nurse*, and *Sleeper*; doubtless, he adds, from its inactive or sluggish habits.

GENUS ZYGÆNA. *Cuvier.*

Head flattened horizontally, truncated or convex in front, with the sides very much extended laterally, appearing hammer-shaped. The eyes placed on the extremities of the lateral prolongations; the nostrils at their anterior margins; mouth beneath.

Obs. This genus now comprises about five species. The existence of a species on the coast of the United States has hitherto been only briefly indicated.

THE HAMMER-HEAD SHARK.

ZYGÆNA MALLEUS.

PLATE LXII. FIG. 204, AND A VIEW OF THE UNDER SIDE.

Hammer-headed Shark, Squalus zygæna. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 284.
Zygæna malleus. VALENCIENNES, Mem. du Mus. d' Hist. Nat. Vol. 9, p. 223, pl. 11, fig. 1 *a* and 1 *b*.

Characteristics. Head three times broader than long. Second dorsal over, slightly behind the anal. Posterior branchial aperture over the base of the pectorals. Length four to eleven feet.

Description, from a young specimen caught in the harbor of New-York. Body cylindrical, elongated. Surface rough when rubbed forwards; under the lens, it appeared to be covered with plates, fluted with minute deep parallel striæ. Head elongated transversely, somewhat convex, above three times broader than long; the anterior margin describing irregularly the arc of a large circle; the posterior margin is rendered straight, thin and submembraneous, by an expansion of the integuments; the lateral margin forming almost a right angle with the anterior edge. Eyes large, and furnished with a lid which is attached to the internal portion of the base of the orbit; the eyes are placed near the angle formed by the anterior and lateral margins, in such a manner as to enable the animal to look above and beneath. Nostrils placed in a deep notch near the angle; they form an oblique slit, partially covered by an acutely pointed process, which is continued by a long and deep furrow along the anterior margin. Mouth crescent-shaped, with three rows of white hyaline teeth above and below. Teeth above triangular, acute, not serrated; their tips directed outwards from the centre, with a shoulder on the outer side; in the centre, a few with shoulders on both sides. All the branchial apertures short and small; the posterior smallest, and placed over the base of the pectorals.

The first dorsal quadrilateral; its origin slightly behind the base of the pectorals, higher than wide, deeply concave behind, and pointed at its posterior tip. Second dorsal rhomboidal, very small, with its posterior tip acutely drawn out behind; its base extends beyond a point vertical to the posterior extremity of the base of the anal. Pectorals placed low down, subtriangular, broad, distant and slightly concave behind. Ventrals small, broad, nearly mid-

aybetween the first and second dorsals, with a narrow pointed tip behind. Anal somewhat larger, but similar in shape to the second dorsal, rather more excavated on its posterior margin. Caudal equal in length to the transverse diameter of the head; the lower lobe short; the upper with a small triangular lobe near its tip.

Color. Uniform dusky grey, with a very slight tinge of reddish brown; cinereous beneath.

Length, 25·0; of the head 2·0; width of ditto, 6·5. Height of first dorsal, 2·5.

This was captured in September, in a seine, in the harbor of New-York, in company with several others. I have seen them in Hellgate four feet long. Dr. Mitchill notices three which were taken in 1805, at Riverhead, Suffolk county, in a net. The largest was eleven feet long; and on opening him, many detached parts of a man, together with his clothing, were found in his stomach.

It is popularly termed *Shovel-nose*, and *Hammer-head*, by our fishermen, and is much dreaded for its boldness and ferocity. The existence of the *S. tiburo* on our coast, as yet rests upon very doubtful authority.

The Hammer-headed Shark is found on both sides of the Atlantic. It ranges on the American coast from Brazil to the shores of Nantucket, south of Cape Cod, which is the most extreme northern limit yet recorded.

GENUS SQUATINA. *Dumeril.*

Body broad, flattened horizontally. Pectorals very wide, extending forward, but separated from the head by a cleft in which are placed the branchial apertures. Head round. Eyes above. Mouth vertical. No anal. Both dorsals behind the ventrals. Temporal orifices.

Obs. This genus forms, by its compressed figure, dilated pectorals and other particulars, a natural passage to the succeeding family. Some recent systematic writers have in fact made it the representative of a distinct group in that family; but, as we think, with little propriety.

THE AMERICAN ANGEL-FISH.

SQUATINA DUMERILI.

PLATE LXII. FIG. 203.

Squatina dumerili. Lesueur, Jour. Acad. Nat. Sciences, Vol. 2, p. 225, pl. 10.

Characteristics. Head bordered on each side by a white membrane. Abdomen, throat and ventral fins marked by red spots. Nostrils with a broad ciliated skin on each side. Length three to four feet.

Description. Body flattened, broad, and elevated towards the pectorals. Tail attenuated and sharp-edged. Head wider than long, obtuse, emarginated in front between the nostrils, depressed above and between the eyes. Neck rather tumid and distinct. Eyes small; orbit elevated, and furnished with blunt tubercles; similar ones above the nostrils and between the

spiracles. Cheeks flat, with numerous mucous pores. Nostrils on the anterior edge, above the jaws, and between the eyes; aperture vertical, and covered by a broad membrane. Spiracles behind the eyes, wide, transverse. Teeth lanceolate, rather gibbose in front, in 6 – 7 distinct series, having each 5 [?] teeth. Branchial apertures very near each other, in front of the pectorals. Tongue triangular, flat, not distinct, terminated by a small fleshy rounded appendage. Pectorals subtriangular, and with a round notch at their inner base; curved sharp points on the upper surface of its outer margin. Abdominal fins lanceolate, straight, narrow. Dorsals two, triangular, and situated on the base of the tail. Caudal fin emarginate; lower lobe longest, both pointed.

Color. Bluish ash-grey above; beneath white. Eyes yellowish green; pupils black. A red spot on the throat and abdomen, and a reddish blotch on the under side of the tail. Pectorals and ventrals bordered with irregular bands of the same color.

Length three to four feet.

This is a very rare species. On the coast of Europe, it has many popular names, such as *Monk* or *Monkey-fish*, *Kingston*, *Shark Ray*, and *Fiddle-fish*. Lesueur describes from three specimens, without, however, indicating the locality; but it is conjectured that they were derived from the southern coast. This is strengthened by the fact that one of them belonged to Mr. Peale, who made extensive collections on the coast of Florida. I do not find it figured among the drawings of my friend Dr. Holbrook. Of the occasional occurrence of this species on the coast of New-York, I have no doubt, as intelligent fishermen have described it to me under the name of *Little Bull-head Shark*, and readily recognized the figure.

GENUS PRISTIS. *Latham.*

Snout produced into a long flattened sword-shaped plate, armed on each side with strong pointed and trenchant osseous spines, implanted like teeth. The true teeth are small, flat, and rounded as in Mustelus. *Branchial apertures beneath.*

Obs. This genus, as revised by Latham and others, now comprises seven species. It forms, by the position of its branchial apertures, a natural passage to the following family, from which it is otherwise separated by its elongated body. Some naturalists have, however, arranged it under the family *Raiidæ*, while others have more precisely erected it into a separate and distinct family.

THE COMMON SAW-FISH.

Pristis antiquorum.

Squalus pristis. Linneus, Syst. Nat.
S. id. Schœpff, Beschreibung, &c. Vol. 8, p. 185.
P. antiquorum. Latham, Linn. Tr. Vol. 2, p. 282.
Saw-Shark. Pennant, Arct. Zool. Supplement, p. 105.
Pristis antiquorum. Latham, Linn. Transact. Lond. Vol. 2, p. 282.
Pez de espada? Parra, Descripcion, &c. p. 75, pl. 33.
P. antiquorum. Richardson, fide Cuvier, Sixth Rep. Br. Association, Vol. 5, p. 222.

Characteristics. Dusky above; pale grey below. Elongated beak, with twenty-four teeth on each side. Length fifteen feet.

Description. I have never met with an undoubted specimen from our coast, and am therefore compelled to cite from Schœpff the only account extant of this species as occurring in our waters: "An individual was captured at New-York in July, 1782. It was fifteen feet "long, including the saw. This had twenty-four teeth on each side, which were very sharp, "and appeared as if they had been sharpened against hard bodies. The air-holes in the "vicinity of the eyes had valvular openings. The skin, particularly of the fins, was of the "finest shagreen." This or another species, most probably the *Pez de Espada* of Parra, occurs along our southern shores. I find in the New World, a weekly journal published in New-York, an account of a Saw-fish which was captured in 1841, among the Keys of Florida. No details were given, to enable one to determine the species.

It remains to notice, at the conclusion of this family, a few species, which have been vaguely, or on loose authority, assigned to our coast; or which have been so imperfectly noticed as to leave a doubt as to their being real species.

Squalus carcharias. (Mitchill, Lit. and Phil. Tr. Vol. 1, p. 485.) This appears to have been inserted at random, or more probably confounded with *S. maximus.* There is no evidence of its occurrence on the coast of the United States.

S. americanus. (Id. Ib. Vol. 1, p. 483;) and subsequently *S. macrodons,* (Id. Am. Month. Mag. Vol. 2, p. 328.) All the particulars given are that "it belongs to the section of *Squali,* which has nasal orifices and an anal fin;" that his body "has a great size;" and that "it has oblong sharp teeth, each of which has a little one on each side of the base." The presence of small basal teeth would seem to indicate its affinity with the genus *Scyllium.*

FAMILY RAIIDÆ.

Body very much flattened out, resembling a disk. Pectorals very large, uniting in front with the snout, and extending backwards to near the base of the ventrals. Tail more or less long and slender. Mouth, nostrils and branchial openings beneath. Eyes and temporal orifices above. Dorsals (when present) almost always on the tail.

Obs. An extremely natural family, and composed of more than one hundred species, distributed throughout the globe.

GENUS RAIA. *Linneus, Cuvier.*

Disk rhomboidal. Tail slender; with two small dorsals near the tip, and sometimes the vestige of a caudal fin. Teeth slender, close set, arranged in quincunx.

THE CLEAR-NOSED RAY.

RAIA DIAPHANES.

PLATE LXVII. FIG. 218. (MALE AND FEMALE.)

Raia diaphanes, Clear-nosed Ray. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 478.

Characteristics. Brownish, spotted. Front rounded, with the nose slightly projecting and prominent. Length two to three feet.

Description. Body obscurely rhomboidal, rounded in front, concave on the sides, dilated and convex over the pectoral fins; in its widest part, broader than long. Sharp recurved prickles over the slightly elevated snout, on the space between the orbits, and on the anterior part of the disk. A double series of very long concealed curved spines directed inwards, on the pectorals. A double, and sometimes a treble row of prickles along the middle of the back, down along the sides of the tail, leaving a central furrow smooth and spineless. Tail slender, tapering, round above, flat beneath, with a membranous expansion on each side, extending three-fourths of the length towards the extremity, when it becomes effaced. Eyes small, black, and furnished with a stellated membrane. Temporal orifices very large, and closed by a stout valve, which is furnished on its edge with a row of white fleshy filaments. A space on each side of the snout, extending backwards nearly to the orbits, so translucent that any dark substance may be seen through it. This space is filled with gelatinous fluid, through

which the blood-vessels may be seen beautifully displayed. Mouth transverse, sinuous; a loose membrane at the angle of the mouth, with a deep furrow extending to the nostrils. The nostrils are furnished with long duplicated fleshy membranes, acting as valves; within, the olfactory nerve is seen expanded in a plumose form, between two oblong brown bodies. Within the mouth, a bilobate membrane behind the upper jaw, and the rudiments of another behind the lower jaw. Teeth in each jaw very minute, arranged with great regularity, and becoming more acute behind. Branchial openings five, with four bony arches.

Two adipose dorsals, small and subequal, ovate, rough, contiguous to each other, and connected behind to the tail by a smooth pellucid membrane; a thin membrane behind the last dorsal, connects it with the extremity of the tail, which has no vestige of a caudal fin. Pectorals rounded, and so much enveloped in the common teguments of the body, that its rays are difficult to be enumerated; they appear to consist of from fifty to sixty rays. Ventrals thick and fleshy, concave on their margins, and contain each from twenty-two to twenty-five rays. The male organs about six inches long, cylindrical, slightly tapering, and, for the greater part of that distance, divided by a deep fissure between two bony cartilages.

The female smaller than the male, and its teeth much smaller. The double series of long concealed prickles noticed on the pectorals of the males, are wanting. A cruciform group of prickles on the back, which unite with the longitudinal row on the back and tail. Behind the vent, two narrow apertures leading into the abdominal cavity. Opening of the rectum narrow, and anterior to that of the uterus, which is large.

Color. Above brownish grey, sprinkled with numerous small irregular rounded and oblong darker spots; beneath white, immaculate.

Length of the body to the vent, 18·0. Extreme breadth, 24·0.

The stomachs of several which I opened, were filled with remains of fishes, squids, crabs and soft clams. The rectum had eight spiral valves; and the appendix vermiformis of Monroe, near its extremity, is very distinct. At the will of the animal, the end of the male organ expands, and discloses three white tubercles, which are received into corresponding cavities when closed. Passing a probe along the fissure, we notice a cartilaginous canal, which leads into a large cavity in the posterior lobe of the ventral fin. In this cavity, an oblong gland, surrounded by strong muscular fibres; this gland was homogenous, yellow, and divided by a deep furrow into two distinct portions. While examining the animal, there was a sudden and profuse discharge of a milky fluid through the appendages.

The Clear-nosed Ray is usually most abundant in our markets about the middle of March, when they may be seen of all sizes from one to three feet. They are caught along with codfish, and are eaten by the poorer classes, although they are insipid gelatinous food.

THE PRICKLY RAY.

RAIA AMERICANA.

PLATE LXVI. FIG. 215. (MALE.)

Characteristics. Uniform brown, unspotted. Snout elongated. Pointed groups of prickles on the upper surface; a vertebral series, and three series along the tail. Length one to two feet.

Description. Body rhomboidal. Snout projecting, attenuated, obtuse. Pectoral fins rounded, subangular. A row of sharp spines on the superciliary ridge, and the interval between and anterior to the eyes covered with numerous star-like points. An elongated heart-shaped space extending from the eyes to the nose, glabrous. A central row of large spines, with lateral rows of smaller ones, extending to the snout, which is covered at the tip with other spines. The spines on the margin abreast of the eyes are broad at the base, with long, sharp and wavy tips; those on the pectorals longer, with narrower bases, and their points directed inwards towards the vertebral line. The whole upper surface of the pectoral is also covered with spines, which are most numerous towards the margins. The vertebral series of spines with broad bases, pointed, recurved, and occasionally fan-shaped. On the tail, which was much injured, there are three rows of spines; one dorsal, and one on each of the sides. Eyes oblong, prominent. Temporal orifices moderately large, and placed a short distance behind the eyes.

Two small dorsals near the tip of the tail. Ventrals widely emarginate. Beneath smooth, except on the snout and anterior margin of the pectoral fins, which are armed with minute prickles. Teeth small, conical, curved, with somewhat enlarged bases.

Color. Uniform pale brownish above; whitish beneath.

Length 20·0; breadth, 13·0. Length of the tail, 9·0.

I have never seen but the single specimen described above, and that was found on the shore of Staten island, Richmond county. I supposed it to be the *R. desmarestia* of Lesueur, but a revision of its characters satisfies me that it is distinct from his Florida species. Its teeth, and the disposition of its prickles, separates it from *R. batis* of Storer; to which, however, it is otherwise allied in shape.

THE SPOTTED RAY.

RAIA OCELLATA.

PLATE LXV. FIG. 212. UPPER AND UNDER SIDE (MALE).

Raia ocellata, Ocellated Ray. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 447.
Raia chantenay. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 4, p. 106, pl. 5.
Ocellated Ray, Raia ocellata. STORER, Report on the Fishes of Massachusetts, p. 191.

Characteristics. Light brown, with numerous ocellated black spots. Length two to three feet.

Description. Body rhomboidal, depressed, with the anterior margin of the pectorals slightly sinuous; the posterior margin undulated, rounded behind, and much attenuated at its junction with the body. Upper surface roughened with distant patches of spines; on the nose, over the eyes, and forming a distinct patch near the centre of the pectorals. A series of distant acute prickles on the dorsal surface of the tail, and another similar series on each side. Snout prominent, and continuous with the line of the sides. Eyes oblong, straw-colored, with a stellated membrane covering the pupils. Temporal orifices situated obliquely behind the eyes, and one inch in length, with a valvular entrance. Mouth transverse, very dilatable, with tubular subpentagonal teeth arranged on the semicylindric jaws; the posterior teeth more pointed. Triangular processes, or nasal lobes of some writers, on each side of the upper jaw, with folds extending to the rounded valvular nostrils. The branchial apertures arranged in an oblique curved series, the posterior smallest. The under side of the body smooth. Tail stout, rounded above, flat beneath, nearly as long as the body. Two small dorsals on the tail, near its extremity. Pectorals with a loose cuticular membrane behind the lateral angle, marked dusky oblique lines indicating the place of the rays; this membrane rather more distinct in the males. Ventrals (in the male) very deeply excavated behind, the posterior lobe broadest; they contain about twenty-four rays. Sexual organs robust, elongated.

Color. The whole upper surface chocolate-brown, with numerous dusky or black spots surrounded by lighter margins. Occasionally these spots are confluent; they are rather more numerous on the female: in young males, they are less distinct. Beneath dusky white, with light brown in the centre and faint pink on the edges. When the thick coat of mucus is scraped off, numerous dark points are visible over the whole surface. The abdominal cavity small, and nearly filled by the enormous liver. The stomach of one was filled with the *Cancer irroratus*.

The Spotted Ray is caught with the hook on our sandy coast, in company with the Cod. It does not appear to be uncommon. It is also found on the coast of Massachusetts.

The branchial apertures disposed in an oblique series, approaching each other behind; the posterior pair six inches apart. Vent longitudinally oval, an inch and a half long. Liver large, and composed of two large unequal lobes. Flesh firm, white and flaky. Pectoral fins broadly rounded. Ventrals broader than long; the outer margin concave, wider than the base; at their junction beneath the tail, there is a rounded emargination.

Color, of the body and base of the tail, a uniform olive brown; beneath white; under side of the tail dark brown. Eyes light grey.

Length of the body, 36·5. Width, 42·0.
Length of the tail, 61·0. Weight, 110 pounds.

This description is taken from a female captured in September, off the coast of Rhode-Island, by Mr. Carson Brevoort of this city. I am indebted to him for an excellent figure made on the spot. On the plate, we have annexed the figure of one of those black horny cases which are often seen along the coast; and as they are empty, they have been jocularly named *Sailor's purses*. They are excluded from the female ray or skate, and contain the embryo.

Remarkable as the Whip Sting-ray is for its size, it appears to have been overlooked by our naturalists, unless it may have been the *R. centroura* of Mitchill described above. It has probably been supposed identical with the Common Sting-ray of Europe.* Schœpff merely remarks that he "noticed two different kinds of skate at Rhode-Island, neither of which "exactly agrees with the species described by Linneus, but I neglected to describe them "particularly."

Mr. Brevoort informs me that they appear to associate together, as he noticed many of similar size and appearance swimming about at the same time. They moved slowly together through the water, along the edges of the rocks, about three feet below the surface. When captured, this individual whipped its tail about with great activity in all directions. It receives the common name of *Whip Ray* from this circumstance, although the name is also applied to another species, which I have not been so fortunate as to obtain.

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* *The Sting-ray of Europe, P. vulgaris* or *Trygon pastinaca*. Tail equaling in length the transverse diameter of the body, with a single spine. Smooth above, except along the central line of the back, and on the upper and posterior part of the pectoral fins, where there is a series of rudimentary tubercles under the skin. Snout sharp, but very short; scarcely projecting beyond the pectorals, etc. etc. It is, moreover, a smaller species than the one above described.

THE BROAD STING-RAY.

PASTINACA MACLURA.

PLATE LXV. FIG. 213.

Raia maclura. LESUEUR, Jour. Acad. Nat. Sc. Vol. 1, p. 41, plate. (Female.)

Characteristics. Body oval, elliptical, broader than long. Tail short; one third of the length of the body. Width six to ten feet.

Description. Shape transversely elliptical. Snout blunt, not produced beyond the lateral margins of the pectoral fins, but continuous with them. Surface roughened with minute granulations like shagreen. Eyes small, and near the snout; temporal orifices large, and near the eyes. Nostrils small, and near the mouth, not extending to the upper lip. Mouth seven or eight inches, with minute numerous triangular acute teeth, each emarginate at the base, for the reception of the hind teeth. Ventral fins short, broad and rounded. Tail short, triangular, one-third of the length of the body, with one or two spines very near the base.

Color. Above greenish blue, with small black vermicular interrupted lines, and larger distant pale spots; beneath pale red. Pupils black, round; irides green, radiated with black.

Length, 42·0. Width, 79·0.

According to Lesueur, whose description and figure I have adopted, this species is found at Newport (R. I.), and is frequently found measuring from fifteen to eighteen feet in width.

(*EXTRA-LIMITAL.*)

P. sabina. (LESUEUR, Ac. S. Vol. 4, p. 109.) Orbicular. Tail more than twice as long as the body. Ventral fins long, pointed. A row of spines upon the back and the origin of the tail. Two spines on each side of the back. Upper part of the head rough. Length ——. *Florida.*

GENUS RHINOPTERA. *Kuhl.*

Head distinctly projecting from the pectorals, and divided into two short lobes; beneath which are two similar ones. Teeth broad and flat.

THE COW-NOSE RAY.

RHINOPTERA QUADRILOBA.

PLATE LXVI. FIG. 217.

Raia bonasus, The Cow-nose Ray. MITCHILL, Trans. Lit. and Phil. Soc. Vol. 1, p. 479.
Raia quadriloba. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 1, p. 44 (plate).

Characteristics. Body rhomboidal, elevated along the dorsal line. Pectorals acute. Tail slender, longer than the body. Width of the body two feet.

THE HEDGE-HOG RAY.

RAIA ERINACEUS.

PLATE LXXVIII. FIG. 246.

Raia erinaceus, Hedgehog Ray. MITCHILL, Am. Jour. Sc. Vol. 9, p. 290, pl. 6. (Male.)

Characteristics. Pale brown, spotted with dusky. Two dorsal fins, and the vestige of a third. Two series of prickles on the tail; prickles on the pectorals. Length seventeen inches.

Description. Form rounded. Rostrum prominent, subacute. Head somewhat distinct from the body, with rounded cheeks; the margin posterior to this, concave; pectorals rounded. Surface smooth, with several groups of prickles arranged in regular series. A group between and in front of the eyes, extend to the tip of the snout; the cheeks are also furnished with several series of prickles. A triangular group on the back, with the apex between the temporal orifices. On the pectoral fins, near the margin, are two rows of about twenty parallel erectile prickles, and a large patch external to these. A double dorsal series along the vertebral line, and extending along the whole length of the tail, on the sides, where they are stiff and stout. Beneath smooth, with the exception of a series parallel with the branchial apertures. Body, when held up to the light, semi-diaphanous. Eyes large, oblique; immediately behind them, the large temporal orifices. Nostrils beneath, near the mouth, with short nasal lobes. Teeth "associated, compact, sharp-pointed." Dorsal fins two, near the extremity of the tail, triangular; the anterior somewhat largest. Pectorals broad and rounded, almost orbicular, with its margin elevated slightly above the inferior surface. Ventrals two-lobed, deeply emarginate; the posterior lobe largest. Male appendages cylindrical, five inches long. Tail nine inches long, smooth on all sides, except the double line of spines above described.

Color. Pale brown above, with numerous dark brown spots; paler beneath.

Length, 17·0. Width, 9·5.

This species was described by Dr. Mitchill, and is different from any with which I am acquainted. It might be confounded with the *R. eglanteria* of Bosc; but that species has the tail with "three or four irregular series with intervening smaller spines, and a small membrane each side of its whole length." The *R. desmarestia* of Lesueur has a prominent snout; rounded and slightly emarginate on the sides, and three spinous series on the tail.

The specimen described by Dr. Mitchill was taken off the coast of New-Jersey, in seven fathoms water. Not having seen the species, I have adopted the description and figure of its original describer.

(*EXTRA-LIMITAL.*)

R. desmarestia. (LESUEUR, Ac. Sc. Vol. 4, p. 100, pl. 4.) Many ranges of long curved points exterior to the eyes, and on the pectoral fins; a range of spines exterior to the eyes, and along the vertebral line. Snout elongate, obtuse. Teeth discoidal, surmounted by a point. Breadth 12½ inches. *Florida.*

R. eglanteria, Bosc. (Les. Ib. Vol. 4, p. 103.) Reddish, sprinkled with small spots. A longitudinal series of 9 – 12 simple spines on each side of the lateral fin. Width 10 inches; length nineteen. *Delaware Bay and Southern Coast.*

GENUS PASTINACA. *Cuvier.*

Tail slender, without fins, but armed with one or more long spines, which are dentated on the edges.

THE WHIP STING-RAY.

PASTINACA HASTATA.

PLATE LXV. FIG. 214. (FEMALE.)

R. centroura? Prickly-tailed Sting-ray. MITCHILL,* Trans. Lit. and Phil. Soc. Vol. 1, p. 479 (male?)

Characteristics. Uniform olive-brown above; white beneath. Upper surface partially smooth. Tail longer than the body, and armed with two or more spines. Width of the body three feet. Length of body and tail five to eight feet.

Description. Body quadrilateral, rounded on the pectoral angles; its transverse and longitudinal diameters nearly equal; its vertical diameter, in the thickest part, between six and seven inches. Snout subacutely pointed, and slightly salient from the lateral margins. Eyes obliquely oval, nine inches and a half from the tip of the snout, and seven inches apart. Temporal orifices oval, oblique, contiguous to the eyes, and an inch and a half long. Nostrils small, five inches apart; the nasal lobes sinuous, truncate. Teeth small, flat, lozenge-shaped, and arranged in quincunx. The upper surface of the body smooth, and covered with a dark-colored mucilaginous slime. From a point slightly anterior to the centre of the body, commences a triple longitudinal series of small horny tubercles, descending along and on each side of the medial line for a short distance on the anterior portion of the tail. Tail long, cylindrical, rough, tapering and flexible towards the end. At the distance of thirteen inches from the base of the tail, on its upper surface, is a small flattened pointed spine, with a row of white acute teeth on its edges, directed downward when the spine is erect. Three inches posterior to this, is another spine of a similar shape and armature, but more formidable from its length, which is five inches, with a deep groove on one side and a corresponding keel on the other; posterior to this large spine, is another an inch and a half long, and similar to the preceding.

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* I make this reference with due reserve, for the following embraces all that Mitchill has said upon the subject:

"RAIA CENTROURA, *Prickly-tailed Sting-ray.* A very large species, found on the coast of Long island, with a tail of five feet or more in length; covered all over with prickly shields or scales, and armed on its upper side with two naked bones of four inches long, inversely serrated."

I find no other notice of this species among his multifarious contributions to the magazines of the day. The prickly shields in the above note can refer only to the tail.

THE SMOOTH SKATE.

RAIA LÆVIS.

The Smooth Skate, Raia lævis. MITCHILL,* Am. Month. Mag. Vol. 2, p. 327.
R. batis? The Skate. STORER, Report on the Fishes of Massachusetts, p. 193.

Characteristics. Small spines on the orbits and anterior margins of the pectoral fins; the rest of the body smooth. Three rows of spines on the tail. Length two to four feet.

Description (*female*). Form rhomboidal. Upon the anterior angle of the eyes, upon the upper orbitar margin, and also at the posterior margin, a number of very small spines; the last situated, smallest. A few spines are also observed upon the anterior margin of the pectoral fins; the remainder of the pectorals naked, with the exception of a small number of very minute spines at the posterior base, just in front of the ventral fins. A single row of spines, larger than are found upon any other part of the body, arm the dorsum of the tail, commencing a short distance before the origin of the ventrals, and continue to the second dorsal fin, with the exception of the space occupied by the first dorsal. A row of rather small spines are situated on each marginal edge of the tail, commencing on a line with the posterior angle of the ventrals. Length of the head to the entire length, nearly 1 to 4. Eyes moderate, oblong; pupils black; irides silvery, with a beautiful golden fringed curtain suspended from above. A slight depression on the top of the head, extending a considerable distance forward towards the snout; top of the snout covered with small flexible spines; extremity of the snout naked. Anterior portion of the body tapering from the lateral angles of the pectorals to nearly a point at the snout, which is slightly blunted. Width

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* Having associated these two species, it will be necessary to reproduce the original description of Mitchill. I have given above, the elaborate description from Dr. Storer.

"RAIA LÆVIS, *Smooth-backed Skate.* With a smooth back, except a row of direct spines along the middle of the tail, and an oblong patch of oblique prickles near the extremity of each wing. Snout pointed, elongated towards the extremity. Upper side dark-colored, clouded and smutty. Tail thick and stout, having three rows of short stiff spines; one along the middle or ridge, and one along the lower margin on each side; they resemble incipient knobs, rather than thorns; towards the end there were two dorsal fins, of nearly the same figure and size; the extremity of the tail itself was soft and flexible, yet it was triangular, like the form of a bayonet. The broad back was of a rather pale ash-color, overspread irregularly with darkish clouds. About the middle of each wing was a spot of a circular form, surrounded as a centre by eight or nine smaller spots, and the central spot itself contained something of lighter and darker shades. There was a roughness, scarcely amounting to prickles, along the margin extending from the tip of the snout to the extremities of the wings. Towards these extremities, there was an oblong patch of about three inches long, and one inch broad, whose surface was beset with rows of prickles placed obliquely, and concealing themselves in channels; they seemed to have a retractile quality. The teeth are distinct, and moveable separately. The curtain of the eye is elegantly fimbriated. The anal fins are large and sinuated, and the appendages between them and the tail are very stout, and of about half the length of the tail. The individual now before me was taken at the city of New-York, beside a wharf in the East river, November 5, 1815. The length was four feet and one inch, and the breadth two feet and four inches; being a large fish."

across the temporal orifices, which are equal in length to the diameter of the eyes and directly behind them, thirteen inches. Width directly in front of the eyes, ten inches; across the top of the snout, one. Ventrals lighter colored than the rest of the body; the rays digitated at their extremities. Dorsals equal in length; the anterior slightly highest, both rounded, and about half an inch apart; the posterior terminates within an inch of the extremity of the tail, by a membranous prolongation, which is more elevated at its posterior extremity. All the under portion of the body dingy white, perfectly smooth, with the exception of a very few spines, hardly perceptible except by the touch, on each side of the commencement of the caudal fins, and a small patch of equally minute spines upon the middle of the tail, just in front of the termination of the ventral fins. Mucous pores over the greatest part of the under side, appearing like black dots, generally irregular; but a longitudinal row towards the middle of the pectorals, and a transverse row at the base of the ventrals. Mouth large, with compact hexahedral teeth, forming almost a plane surface; the inner angle of the innermost middle ones beginning to become acute. Nostrils distant from the mouth half its length. Pectoral rays very obvious beneath. Anal opening oblong; above of a light-ash color, sprinkled over its entire surface with blackish ocellated spots more or less large. Margin of the pectorals reddish. Length three feet three inches; width two feet. In a male four feet six inches long and three feet wide, Dr. S. noticed all the under surface roughened with numerous small tubercles; the teeth quite sharp, presenting in their middle portions acute angles, recurved, exhibiting regular rows passing backwards, with a space of a line or more between them. On a line opposite the eye, on the margin of the pectorals, from four to six longitudinal rows of strong recurved spines; on the back of the pectorals, towards the lateral angle, are four to five longitudinal rows of spines directed towards the dorsum of the fish.

Color, uniform light brown, with no ocellated spots.

Although this species, as I have reason to believe, is frequently sold in our markets under the name of *Skate*, yet it has always appeared cut up into small portions, and I have never had an opportunity of examining or obtaining a figure of the unmutilated animal. We find in the European Skate the following characters, which appear to be much at variance with those given above: "No spines in front of the eyes; spines on the ridge of the tail, each with a broad oval tubercular base; lateral spines few, rarely exceeding six, and entirely wanting on the lower two-thirds of the tail; frequently a solitary spine between the two dorsals. Skin above rough, granulated. Teeth numerous, sharp pointed, with broad bases." On the coast of Europe, the skate is considered quite a delicacy, particularly the pectoral fins.

Description. Form quadrilateral. Body smooth, elevated in the centre. Head sloping above, divided transversely and laterally into four flattened lobes rounded in front; the lower lobes rather longest; the neck with several protuberances. Eyes lateral. Pectoral fins wide, pointed at the lateral angles, excavated posterior to this, and rounded behind. Ventral fins oblong, truncated behind. Dorsal fin small, triangular, and placed on the base of the tail. Mouth wide, with several series of flat hexagonal teeth, of which the middle are largest, elongated. Temporal orifices large. Nostrils situated midway between the mouth and the extremity of the snout. Nasal lobe, truncate, denticulate. Tail long, and exceedingly slender; longer than the body. A slender serrate spine, behind the dorsal fin, on the superior part of the tail.

Color. Olive-brown above; beneath white.

Length three feet; of the body alone, 18·0. Width two feet.

This is an exceedingly common species about New-York in the autumn. With its powerful spade-like snout, it roots up clams (*V. mercenaria*), and crushes them between its flattened teeth, which appear to act upon each other like the cylinders of a rolling mill. In the male, the pectorals are acute behind, and the ventral fins are more obliquely truncated; the dorsal prominence is not very distinct in the living specimen. The name proposed by Mitchill, although it has the priority in point of date, must yield to that of Lesueur, defective as it is, as the former is unaccompanied with any description.

(*EXTRA-LIMITAL.*)

Genus MYLIOBATIS, *Dumeril.* Teeth wide, flat, paved. Tail slender, elongated, and armed above with a serrated spine, and furnished with a fin. Head prominent beyond the pectorals, which are wide.

M. freminvillii. (LESUEUR, Ac. Sc. Vol. 4, p. 111.) Orbit salient, surrounded by an eminence. Ventrals rounded. Olivaceous, with rounded spots. Tail long, filiform, triangular. Width two to three feet. *Rhode-Island.*

M? say. (ID. Ac. Sc. Vol. 1, p. 42.) Suborbicular, olivaceous red above. Teeth dilated, and rhomboidal at the base. Two elongated vertical opposite fins on the tail, behind the spine. Width 17 inches. *New-Jersey.*

GENUS CEPHALOPTERA. *Dumeril.*

The pectorals produced into long processes at their anterior entremities, presenting the appearance of two horns. Teeth slender. Dorsal small. Tail slender, with a serrated spine.

THE SEA DEVIL.

CEPHALOPTERA VAMPIRUS.

PLATE LXVII. FIG. 219.

The Vampire of the Ocean, C. vampirus. MITCHILL, Annals Lyceum, N. Y. Vol. 1. p. 23, pl. 2, fig. 1.
Cephaloptera giorna. LESUEUR, Jour. Acad. Nat. Sciences, Vol. 4, p. 117, pl. 6, fig. 1.

Characteristics. Tail longer than the body, and armed with one or more spines. Dorsal between the ventrals. Anterior margin of the pectorals convex; posterior concave. Width 16 – 18 feet.

Description. Body large; the transverse much exceeding its longitudinal diameter. Skin rough to the touch, as in many species of *Squalus*, but without any evident tubercles or spines. Head not distinct from the body, subtruncate in front, slightly convex. Mouth subterminal, with very small teeth in seven or eight rows in the lower jaw, distant, and in quincunx; those of the upper jaw scarcely visible. Nostrils small, and placed near the angles of the mouth, two feet apart. Eyes prominent, lateral, four feet apart, and placed on an eminence at the base of the frontal appendices. Branchial apertures narrow, linear, varying from one to two feet in length, with valvular coverings. Tail long, slender, subcompressed, terminating in a slender extremity.

The dorsal fin small, triangular, with thirty-six rays, and placed over the base of the tail between the ventrals; a short serrated spine, just anterior to it. Pectorals much elongated, pointed, arched in front, concave behind; the frontal appendices projected on each side of the mouth, and used as instruments of prehension; they are two feet and a half long, and a foot wide. Ventrals broad, short, deeply emarginate and rounded behind; continuous in front with the pectorals.

Color. Blue black above; dusky, varied with large opaque white clouds, beneath.

Length to the base of the tail, 10 feet; to the end of the tail, 16 feet. Width across the tips of the pectorals, 17 feet.

This is one of those huge monsters of the deep, which are occasionally captured along our shores. It was first noticed by Catesby (Vol. 1, p. 32), on the coast of Carolina, where it appears to be more frequent than farther north. The next notice is by Dr. Mitchill, cited above, from a specimen captured at the mouth of Delaware bay. Another individual was taken at Savannah, in 1824. Lesueur, who described it anew from the specimen examined by Dr. Mitchill, considered it as identical with the *R. giorna* of Lacépède. I have carefully compared these descriptions, and find too many striking dissimilarities to enable me to con-

sider them as identical. In this view I am sustained by Cuvier in the last edition of the *Règne Animal*. The *giorna* rarely exceeds fifty pounds in weight, according to Risso ; while our species is so large, that according to Mitchill, it required three pair of oxen, aided by a horse and twenty-two men, to drag it to the dry land. It was estimated to weigh between four and five tons. It approaches, in fact, nearer to the *C. massena* of Risso.

The Sea Devil, or *Oceanic Vampire* as it has been not unaptly named, is known to seize the cables of small vessels at anchor, and draw it for several miles with great velocity. An instance of this kind was related to me by a credible eye-witness, as having occurred in the harbor of Charleston. A schooner lying at anchor, was suddenly seen moving across the harbor with great rapidity, impelled by some unknown and mysterious power. Upon approaching the opposite shore, its course was changed so suddenly as nearly to capsize the vessel, when it again crossed the harbor with its former velocity, and the same scene was repeated when it approached the shore. These mysterious flights across the harbor were repeated several times, in the presence of hundreds of spectators, and suddenly ceased.

There is strong presumptive evidence, from the authorities cited by Mitchill and Storer, of the existence of a Ray on our coast, belonging to the Genus *Torpedo*, and called *Numb-fish* and *Cramp-fish ;* but as yet it has not been examined by any naturalist.

ORDER III. CYCLOSTOMI.

Gills purse-shaped, fixed, opening outwards by several apertures. Jaws represented by an immovable cartilaginous ring, formed by the union of the palatine and mandibular bones. Intestinal canal straight and narrow.

Obs. The skeleton of the fishes of this order is very imperfectly developed; so much so that they are considered, and with justice, to be the most imperfect of all vertebrated animals. It forms a small group, scarcely exceeding a dozen species.

FAMILY PETROMYZONIDÆ.

Body elongated, cylindrical, eel-shaped. No pectorals nor ventrals. Fins without rays.

GENUS PETROMYZON. *Linneus.*

Seven branchial apertures on each side of the neck. Maxillary ring armed with strong teeth. Mouth beneath.

THE AMERICAN SEA LAMPREY.

PETROMYZON AMERICANUS.

PLATE LXVI. FIG. 216.

P. marinus, Sea Lamprey at New-York. Schœpff, Beobachtungen, &c. Vol. 8, p. 184.
The Great Lamprey, Petromyzon marinus. Mitchill, Trans. Lit. and Phil. Soc. Vol. 1, p. 461.
Petromyzon americanus. Lesueur, Am. Phil. Soc. new series, Vol. 1, p. 382.
P. id. Id. Hist. N. A. Fishes, ined. plate.
The American Lamprey, P. id. Storer, Report on the Fishes of Massachusetts, p. 195.

Characteristics. Body olive-green mottled with dark brown; ending behind in an acute tip. Throat armed with three large teeth. Length two to three feet.

Description. Head depressed, and with the mouth closed, obtusely conic; a single tubular orifice equidistant from, and slightly anterior to the eyes. Back subcarinate. A row of mucous ducts on each side of the head, from the snout towards the eyes; a row of from six to eight before the eyes, and directed forwards; another from the lower side of the mouth, rising upwards towards the extremity of the snout; a short series running backwards, from the superior part of the orbits; a distant series along the back, on each side; an indistinct unequal row between each branchial aperture, and irregular groups and series distributed over the whole anterior part of the body. Mouth forming a longitudinal fissure, and when attached to any thing, assumes the form of a regular circle. Teeth of various kinds, which may be considered as disposed in concentric circles about a common centre, or as arranged in somewhat

curved series radiating from the pharynx; this will be better conceived by reference to the figure. In the throat, and partly closing it, is an isolated group of three large teeth, of which two are lateral and one inferior. The lateral teeth are sinuous on their edges, denticulate, and terminated posteriorly by a smooth cartilaginous process. The inferior tooth is also denticulate, with a central elongated process projecting into the space between the lateral ones. Beneath this last is a single tooth, forming a solid semicircular cartilaginous ring, with seven acute yellow points. Underneath this again, are nine perpendicular rows of simple teeth, divided vertically from each other by a distinct furrow. Considered as concentric rows, they vary in number from four to six. The first superior tooth above the throat is bifid; and in a line above this are two single teeth, and one almost obsolete. From each extremity of the seven-cleft tooth we enumerate five concentric radii of simple teeth, excepting the internal ones of the second, third and fourth rows. Lips fleshy, with a distinct and slightly fimbriated membrane; and beneath this we notice a deep triangular fossa, with a distinct fold on each side.

The first dorsal commences at a point nearly equidistant between the head and tail; it is low, composed of very minute rays, and gradually diminishes in height from the middle of the fin each way. The second dorsal higher than the first, and commences on the posterior third of the body, and about two inches behind the first; it gradually decreases behind, until it overlies what is usually described as the upper lobe of the caudal. The lower lobe (which, together with the upper, is truncate behind) gradually diminishes forward, until it becomes insensibly effaced in a soft fleshy mass towards the vent; this lower lobe contains about thirty-four rays.

Color. Bluish brown mottled with dark olive-green, which is the general color along the back; beneath silvery grey. Pupils black; irides golden. First dorsal greenish; the second reddish. Tail dark brown.

Length, 30·0. Greatest girth, 6·0.
Fin rays, D. 80.90; C. 80.

This species is very different in its dentition from the *P. marinus* of Europe, although described as such by Schœpff and Mitchill. In this respect it agrees better with the *P. americanus* of Lesueur, in his unpublished work on the fishes of America, for a copy of which I am indebted to my amiable and valued friend Mrs. Say. The description in his work of the pharyngeal teeth, and of the lower lobe of the caudal fin, does not, however, exactly coincide with that above described.

The Sea Lamprey is commonly taken in our bays and salt-water streams about the month of April, and judging by the prices at which they are sold, must be held in high estimation by the epicures. They ascend streams, and construct conical heaps of stones, among which they deposit their spawn. I have observed them at Albany in the spring, and was assured that they were taken a few miles below that city.

THE BLUISH SEA LAMPREY.

PETROMYZON NIGRICANS.

PLATE LXXIX. FIG. 247.

Petromyzon nigricans. LESUEUR, Am. Phil. Soc. new series, Vol. 1, p. 385.
The Bluish Lamprey, P. id. STORER, Report on the Fishes of Massachusetts, p. 196.

Characteristics. Dorsals distinct, white. Mouth with incurved teeth, projecting from widened bases. Length five to seven inches.

Description. Body cylindrical on its anterior third, compressed behind. Head oval, flattened on the top. Length of the head to the posterior angle of the eye, to the total length, less than one-seventh. The branchial orifices running obliquely backward and downward from the eyes. Mouth circular, half an inch in diameter, surrounded by a fleshy margin; armed within with numerous incurved teeth or horny spines projecting from widened bases, resembling the spines with which the Raiæ are armed. Three teeth in the throat; two higher up than the third, which is in front of and between the others. In the general appearance of the teeth, there is great resemblance between those of this species and the preceding. Eyes moderate. A spiracle on the top of the head, anterior to the eyes. The first dorsal fin commences back of the middle of the fish; its posterior portion rounded; its height to its length as 2 to 8. The distance between the dorsals is equal to half the length of the first dorsal. The second dorsal considerably higher than the first; before reaching the caudal fin, to which it is continued, it is depressed. Caudal fin a simple membrane, triangular at its termination, and uniting with the anal fin, which is very small. Anus small.

Color. Upper part of the body of a deep blue color; beneath bluish white. Pupils black; irides silvery. Between the eyes, on the top of the head, a small white spot. Dorsals white; the second occasionally margined with bluish.

Length 5·0 – 7·0.

I am only acquainted with this species through the descriptions of Lesueur and Storer. It is found attached to mackerel, haddock and cod fishes.

THE SMALL LAMPREY.

PETROMYZON APPENDIX.

PLATE LXIV. FIG. 211.

Characteristics. Dorsals continuous, yellow. Anal fin with a thread-like appendix on its anterior portion. Length four to six inches.

Description. Body cylindrical, compressed on its posterior half. Head rounded in front. Eyes large, prominent, and near the dorsal outline. Temporal orifice tubular, central, and about two-tenths of an inch anterior to a line drawn across the eyes. Mouth beneath, circu-

lar, with a fimbriated margin. A ring of irregularly shaped corneous processes within the oral orifice, and a large isolated double tooth of the same texture on the inferior portion of the mouth. Branchial apertures in an obliquely descending series, valvular; the first is three-tenths of an inch distant from the eye. Branchial sac pearly white within, somewhat dilated. Sides of the body with numerous vertical rugæ.

The first dorsal commences at a point somewhat nearer the head than the tail; it is subtriangular, longer than high, 0·6 long, when it subsides into a low membrane, elevated about a tenth of an inch above the body; then rises and forms a high rounded fin, in which fibres representing rays may be detected; again it subsides into a low membrane, extending to within half an inch of the caudal extremity, when it assumes a subtriangular figure, passing round the tail, and is dilated beneath it, forming a rounded fin 0·5 long; it then subsides into a low cuticular fold, which gradually rises into a fin 0·1 high as it approaches the vent, where it terminates. A slender thread-like process, 0·3 long, and apparently tubular, arises from its anterior extremity. Vent near the posterior third of the animal.

Color. Dark plumbeous above, somewhat paler along the sides, but not separated by a defined line. Irides silvery. All the fins of a pale amber-color.

Length 4·0 – 6·0.

This small Lamprey I first obtained from Mr. Joseph Mauran of Providence; and have since received specimens, agreeing with it in every particular, from the Hudson river. It is allied to, but as I conceive very distinct from, the preceding species.

(*EXTRA-LIMITAL.*)

P. argenteus. (KIRTLAND, Bost. Jour. Vol. 3, p. 342, pl. 4, fig. 3.) Silvery grey on the sides, with irregular series of black dots. A black dot over each branchial aperture. Length 11 inches. *Big Miami, Ohio.*

P. tridentatus. (RICHARDSON, F. B. A. Vol. 3, p. 293.) Bluish grey, with irregular yellowish patches. Three conspicuous teeth. Dorsals distinct. Length 21 inches. *Tributaries of the Columbia River.*

P. lamottenii. (LESUEUR, Hist. N. A. Fishes, Op. ined.; pl. 79, fig. 249, of this work.) Yellowish on the sides, with irregular patches of dark brown above; white beneath. The mouth pectinated on its margin. Dorsals continuous.

GENUS AMMOCŒTES. *Dumeril.*

Mouth without teeth. Upper lip prominent, semicircular, covering only the upper part and sides of the mouth; lower lip transverse. Branchial apertures as in the preceding.

THE COLORED MUD LAMPREY.

AMMOCŒTES BICOLOR.

PLATE LXXIX. FIG. 248.

Ammocœtes bicolor. LESUEUR, Am. Phil. Soc. New Series, Vol. 1, p. 386.
The Mud Lamprey, A. bicolor. STORER, Fishes of Massachusetts, p. 198.

Characteristics. Back and sides reddish, separated by an undulating line from the white abdomen. Dorsals separated.

Description. Anterior part of the body subcylindric; posterior part compressed, and tapering to the tail. Dorsals low, separated; the second united with the caudal fin, which is rounded. Nape of the neck elevated. Head declivous, prolonged into a snout, furnished with a lip, having two short rounded lobes; these lobes, when the mouth is closed, embrace and conceal the lower lip, which is very short. Nostrils small, and placed in the centre of a white oval pellucid disk, easily movable. On the inside of the upper lip, small granules; and at the opening of the throat, small ramified papillæ. Branchial apertures placed in a longitudinal depression, oblique and a little curved; the first aperture above the angle of the mouth. On each side of the head there is a whitish spot, indicating the position of the eyes.

This species was first described by Lesueur, from the Connecticut river, near Northampton, but has not since been observed.

THE PLAIN MUD LAMPREY.

AMMOCŒTES UNICOLOR.

PLATE LXXIX. FIG. 250.—(STATE COLLECTION.)

Characteristics. Color nearly uniform throughout. Dorsal single. Length three to five inches.

Description. Form cylindrical for two-thirds of its length from the head, becoming slightly compressed just anterior to the vent, very much compressed and acuminated at the tail. Surface smooth, with between eighty and ninety transverse folds, giving the body an annulated appearance. Nape arched; head sloping to the anterior lip. Mouth quadrilateral. Opening to the throat very large, but accurately closed by six irregular and ragged subcartilaginous processes, which meet in the centre. Anterior lip transverse, convex on its outline, and emarginate at each end, where it unites with the lateral lips; these latter are wide and convex

on their slender margins, uniting posteriorly below the edge of the lower lip, leaving them free above. Eyes distinct, lateral, and covered with the common teguments, 0·05 in diameter, and placed in a depression over the margin of the lower lip; they are distant 0·2 from the end of the snout. Temporal orifice large, and surrounded by a raised margin; contracted, linear in front, circular behind; it is placed on the summit of the head, 0·15 anterior to the eyes. The branchial furrow is half an inch long, directed obliquely downwards, and extends to a point above the lower angle of the lateral lips; the apertures are exceedingly small, and appear to be capable of being closed by their membranous edges. Vent a large longitudinal aperture, 1·3 distant from the tip of the tail. The fins appear to be nothing more than mere membranous prolongations of the skin, without the slightest vestige of rays. The dorsal commences 1·6 distant from the tail, and 0·3 anterior to the vent, in a scarcely perceptible furrow, and advances low and subequally until about the middle of its length, when it begins to rise, and then rapidly diminishes at the tip of the tail, but at no point exceeds 0·1 in height; anterior to its origin, is an obsolete furrow, extending 0·7 towards the head. The dorsal unites with the caudal and anal, which latter is obsoletely triangular, and becomes insensibly effaced at a point 0·6 posterior to the vent.

Color. Of a nearly uniform dark or dusky brown, occasionally verging to bluish, somewhat lighter beneath; the anterior part of the head darkest.

Length, 4·0. Depth, 0·3.

This species, which is common in most of the muddy streams of the northern and western districts, varies in thickness from that of a common earth-worm to the size of a swan's quill. I have lately received specimens through the kindness of Mr. Z. Thompson of Burlington, Vermont, who obtained them from Lake Champlain. It resembles the *A. branchialis* of Europe, although much larger, and is very distinct from it by its single dorsal. Its popular name in this state is *Lamper Eel.* I am not aware that it is used for any other purpose than as bait for other fishes.

In concluding the descriptions of such of the living fishes of the State as I have been enabled to procure, and which is very far from exhausting the list, a notice of the fossil species would appear to be necessary. It is, however, remarkable, that although numerous species are found in the neighboring States of Massachusetts and Connecticut on the one hand, and New-Jersey on the other, none, until very recently, have been detected in this State.* At present, one species only, the *Holoptychius nobilissimus*, is positively known to be found within our limits. The following list may be found useful to the student of our fossil ichthyology. In drawing it up, I have to acknowledge my obligations to J. H. Redfield, who, together with his father Mr. W. C. Redfield, have most largely contributed to the stock of our knowledge on this subject.

GENUS HOLOPTYCHIUS. *Agassiz.*

1. *H. nobilissimus.* Am. Jour. Science, Vol. 38, p. 89. — Murchison, Silurian System, Vol. 2, p. 599, pl. 2, figs. 1, 2, 3, 4, 8, 9.

   Old red sandstone. *Blossburgh, Pennsylvania; New-York.*

GENUS PALÆONISCUS, *Agassiz.*

2. *P. fultus.* Agassiz, Poiss. Fossiles, Vol. 2, pp. 43, 102, pl. 8, *f*, figs. 4, 5. — Hitchcock, Am. Jour. Vol. 6, p. 77. — Id. Rep. Geol. Mass. 1st ed. p. 236, pl. 14, fig. 46. — W. C. Redfield, Am. Jour. Vol. 41, p. 25.

   New red sandstone. *Sunderland (Mass.); Middletown and Durham (Conn.); Boonton (N. Jersey.) — Pompton (N. Jersey)*, W. C. Redfield, Am. Journal, Vol. 44.

3. *P. latus.* J. H. Redfield, Ann. Lyc. Nat. Vol. 4, p. 39, pl. 2. — W. C. Redfield, Am. Jour. Vol. 41, p. 25. — *Eurynotus tenuiceps?* Agassiz, Poissons Fossiles, Vol. 2, p. 159, pl. 140, figs. 4, 5. — Hitchcock, Am. Jour. Vol. 6, p. 77; Rep. Geol. Mass. p. 236, pl. 14, figs. 45, 48.

   New red sandstone. *Sunderland (Mass.); Middletown and Durham (Conn.); Bounton (N. J.) — Pompton (N. Jersey)*, W. C. Redfield, Am. Jour. Vol. 44.

4. *P. macropterus.* W. C. Redfield, Am. Jour. Vol. 41, p. 25.

   New red sandstone. *Sunderland (Mass.); Middletown and Durham (Conn.); Boonton (N. J.)*

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* Since the above has been in the hands of the printer, I have received the following interesting communication from Mr. W. C. Redfield:

"Although the genera Palæoniscus and Catopterus have not been found in New-York, the new red sandstone, or "'middle secondary' of Prof. Rogers, to which they are peculiar, extends through Rockland county from the flank of the "Highlands to the Hudson river, and the boundary line between New-York and New-Jersey, and occurs also in Orange "county in the vicinity of Long pond. From the position and line of strike of the New-Jersey fish beds, it would ap- "pear probable that these fossils should be found in Rockland county. Two of the fish beds alluded to have indeed been "lately discovered near Ramapo, about ten miles from the State boundary. I have obtained from these beds, two or three "new species of Palæoniscus, one of which bears a close resemblance to the *P. elegans* of Mr. Sedgwick, which is found "in the magnesian limestone or new red formation of England."

5. *P. agassizii.* Id. Am. Jour. Vol. 41, p. 26.
New red sandstone. *Westfield, Middlefield and Durham (Conn.); Sunderland (Mass.); Boonton (N. J.) — Pompton (N. Jersey)*, W. C. Redfield, Am. Jour. Vol. 44.

6. *P. ovatus.* Id. Am. Jour. Vol. 41, p. 26.
New red sandstone. *Same localities.*

GENUS CATOPTERUS. *J. H. Redfield.*

7. *C. gracilis.* J. H. Redfield, Ann. Lyc. N. Y. Vol. 4, p. 37, pl. 1. — W. C. R. Am. Jour. Vol. 41, p. 27.
New red sandstone. *Same localities.*

8. *C. macrurus.* W. C. Redfield, Am. Jour. Vol. 41, p. 27.
Sandstone shales. *Chesterfield county, Virginia.*

9. *C. anguilliformis.* Id. Am. Jour. Vol. 41, p. 27. — *Murena anguilla?* Hitchcock, Am. Jour. Vol. 6, p. 78.
New red sandstone. *Middletown (Conn.); Boonton (N. J.)*

10. *C. parvulus.* Id. Am. Jour. Vol. 41, p. 28.
New red sandstone. *Same localities.*

GENUS PTYCHODUS. *Agassiz.*

11. *P. mortoni.* Mantell. — Morton, Synopsis Organic Remains, pl. 18, figs. 1, 2. — Agassiz, Vol. 3, pl. 25, figs. 1, 2, 3.
Greensand formation. *New-Jersey.*

12. *P. mammillaris.* Agassiz, Poiss. Fossiles, Vol. 3, p. 151, pl. 25, *b*, figs. 11 to 20.
Greensand formation. *Chesapeake and Delaware Canal.*

GENUS CARCHARIAS. *Cuvier, Agassiz.*

13. *C. lanceolatus.* Agassiz, Poissons Fossiles, Vol. 3, pl. 30, figs. 1 to 3. — Morton, Synopsis Org. Rem. pl. 12, figs. 3, 5.
Greensand formation.

14. *C. grosseserratus.*
15. *C. macrodon.*
16. *C. minor.*

I have seen these indications of new fossil species from the tertiary beds of Maryland, in some foreign publication, which I cannot at this moment cite with certainty. The types of these species are said to be in the collection of the Earl of Enniskillen.

17. *C. megalotis.* Agassiz, Poissons Fossiles, Vol. 3, pl. 28, figs. 8 to 10. — Morton, Synopsis Organic Remains of the U. S. pl. 12, fig. 4.
Greensand formation.

18. *C. polygurus.* Agassiz, Poissons Fossiles, Vol. 3, pl. 30, figs. 9 to 12. — Morton, Synopsis Org. Rem. pl. 12, fig. 2.
Greensand formation.

GENUS GALEUS. *Cuvier.*

19. *G. pristodontus.* Agassiz, Poiss. Fossiles, Vol. 3, pl. 26, fig. 6. — Morton, Synopsis Org. Rem. pl. 11, fig. 6.
Greensand formation.

GENUS LAMNA. *Cuvier.*

20. *L. acuminata.* Agassiz. — Morton, Synopsis Org. Rem. pl. 11, fig. 11.
Greensand formation.

21. *L. lanceolata.* Agassiz. — Morton, Synopsis Org. Rem. pl. 11, fig. 5.
Greensand formation.

22. *L. plicata.* Agassiz. — Morton, Syn. Org. Rem. pl. 11, figs. 2, 3.
Greensand formation.

GENUS OTODUS. *Agassiz.*

23. *O. appendiculatus.* Agassiz, Poiss. Fossiles, Vol. 3, pl. 32, figs. 1 to 25.
Greensand formation?

GENUS SAUROCEPHALUS. *Harlan.*

24. *S. lanciformis.* Harlan, Jour. Ac. Nat. Sc. Vol. 3, p. 331, pl. 12, figs. 1 to 4. — Id. Med. and Phys. Res. p. 286. — Agassiz, Poiss. Fossiles, Vol. 5, pl. 25, *c*, figs. 21 to 29. — Mantell, Southdown Fossils, pl. 33, figs. 6, 7. — Hays, Am. Phil. Tr. Vol. 3, pl. 16.
Subcretaceous group. *Missouri.*

25. *S. leanus.* Harlan, Med. and Phys. Res. p. 286. — *Saurodon.* Hays, Am. Philos. Soc. Vol. 3, p. 471, pl. 16, figs. 1 to 10. — Agassiz, Poissons Fossiles, Vol. 5, pl. 25, *c*, figs. 17 to 20.
Greensand. *Five miles S. E. Moorestown, New-Jersey.*

APPENDIX A.

A LIST OF THE SPECIES NOTICED OR DESCRIBED BY DR. MITCHILL,

WITH THE NAMES WHICH THEY BEAR IN THE PRESENT VOLUME.

Mem. refers to his larger essay in the Transactions of the Literary and Philosophical Society.
Rep. refers to his first Report.
Suppl. refers to his Supplementary Memoir in the American Monthly Magazine, Vol. 2.

[The names in italics are synonimes.]

Acipenser sturio	*Mem.* p. 461	Acipenser brevirostris.
A. oxyrhincus	" 462	A. oxyrhincus.
Ammodytes tobianus	" 363	Ammodytes americanus.
Anarrhicas lupus	*Suppl.* 242	Anarrhicas lupus.
Anguilla vulgaris	*Mem.* 360	Anguilla tenuirostris.
A. oceanica	*Ac. Sc.* Vol. 1, 407	A. oceanica.
A. conger	*Mem.* 360	Conger occidentalis.
Atherina mordax	" 446	Osmerus eperlanus?
A. notata	" 446	Atherina notata.
A. viridescens	" 447	A. menidea.
Balistes broccus	" 467	Monocanthus broccus.
B. cuspicauda	*Suppl.* 326	Aluteres cuspicauda.
B. aurantiacus	*Mem.* 468	Monocanthus aurantiacus.
Blennius labrosus	" 375	Zoarces anguillaris.
B. ciliatus	" 374	Z. fimbriatus.
B. pholis	" 374	Chasmodes bosquianus.
Bodianus argyroleucos	" 417	Corvina argyroleuca.
B. costatus	" 417	Micropogon costatus.
B. triourus	" 418	Lobotes surinamensis.
B. exiguus	" 419	
B. pallidus	" 420	
B. rufus	" 420	Labrax rufus.
B. flavescens	" 421	Perca flavescens.
Centronotus spinosus	" 490	Elacate atlantica.

Cephalopterus vampirus	*Ann. Lyc.* 1,	23
Cephalus brevis	*Mem.*	471
Chetodon oviformis	*Suppl.*	248
C. ——	Plate,	*Mem.*
Clupea alosa	*Mem.*	449
C. harengus	*Suppl.*	323
C. mediocris	*Mem.*	450
C. mattowaca	"	451
C. halec	"	451
C. pusilla	"	452
C. parvula	"	452
C. menhaden	"	453
C. *indigena*	"	454
C. vernalis	*Rep.* 22, and *Mem.*	454
C. æstivalis	*Mem.*	456
C. vittata	"	456
C. cerulea	"	457
C. sadina	"	457
Coryphena hippuris	"	378
C. perciformis	*Suppl.*	244
Cyprinus teres	*Mem.*	458
C. cornutus	*Suppl.*	324
C. oblongus	*Mem.*	459
C. corporalis	*Suppl.*	324
C. chrysoleucas	*Mem.*	459
C. atromaculatus	*Suppl.*	324
C. atronasus	*Mem.*	460
Cottus 18-spinosus	"	380
C. æneus	"	380
C. scorpio	"	381
Cyclopterus ceruleus	"	480
Diodon pilosus	"	471
D. carinatus	*Ann. Lyc.* 2,	264
D. maculatostriatus	*Mem.*	270
Echeneis naucrates	"	377
E. remora	"	378
E. albicauda	*Suppl.*	244
Elops inermis	*Mem.*	445
Esox flavulus	"	439
E. lucius	"	440
E. pisciculus	"	440
E. pisculentus	"	441
E. osseus	*Suppl.*	321

Cephaloptera vampirus.
Orthagoriscus mola.
Ephippus faber.
Id.
Alosa præstabilis.
Clupea elongata.
Alosa mattowaca.
Id.
Clupea virescens.
C. fasciata?
C. parvula.
Alosa menhaden.
A. præstabilis (young).
A. tyrannus.
Clupea vittata.
C. cerulea.
Alosa sadina.
Coryphena globiceps.
Palinurus perciformis.
Catostomus teres.
Leuciscus cornutus.
Labeo oblongus.
Leuciscus corporalis.
Stilbe chrysoleucas.
Leuciscus atromaculatus.
L. atronasus.
Cottus virginianus.
C. æneus.
C. mitchilli.
Lumpus anglorum.
Diodon pilosus.
Acanthosoma carinatum.
Diodon maculostriatus.
Echeneis naucrates.
E. remora.
E. albicauda.
Elops saurus.
Fundulus fasciatus.
Esox reticulatus.
Fundulus viridescens?
Lepisosteus.

Esox ovinus	*Mem.*	441	Lebias ovinus.
E. scomberius	*Suppl.*	322	Esox fasciatus. Esox?
E. longirostris	"	321	Belone? Belone truncata?
E. tredecimlineatus	*Mirror.*	361	Esox id.
E. zonatus	*Mem.*	443	(Young.)
E. salmoneus	"	442	Esox.
E. belone	"	443	Belone truncata.
E. maskinongy	*Mirror.*	297	Esox estor.
Exocetus mesogaster	"	297	?
E. comatus	*Mem.*	448	Exocetus comatus.
E. noveboracensis	*Suppl.*	323	E. noveboracensis.
E. furcatus	*Mem.*	449	E. furcatus.
Fistularia neoboracensis	"	437	Fistularia tabacaria.
Gadus morrhua	*Mem.*	367	Morrhua americana.
G. lacustris	*Suppl.*	244	Lota maculosa.
G. albidus	*Ac. Sc.* 1,	409	Merlucius albidus.
G. merlucius	*Mem.*	371	M. albidus.
G. callarias	"	367	Morrhua americana.
G. pruinosus	*Rep.*	4	M. pruinosa.
G. tomcodus	*Mem.*	368	M. id.
G. æglifinus	"	370	M. æglifinus.
G. blennoides	"	370	Morrhua?
G. purpureus	"	370	Merlangus purpureus.
G. tenuis			Phycis tenuis.
G. longipes	"	372	P. americanus.
G. punctatus	"	372	P. punctatus.
Gasterosteus biaculeatus	"	430	Gasterosteus biaculeatus.
G. quadracus	"	430	G. quadracus.
Gobius viridipallidus	"	379	Gobias alepidotus.
Labrus squeteague	"	396	Otolithus regalis.
L. tautoga	"	399	Tautoga americana.
L. chogset	"	403	Ctenolabrus ceruleus.
L. auritus	"	202	Pomotis vulgaris.
L. appendix	*Suppl.*	247	P. appendix.
L. versicolor	*Mem.*	404	Pagrus argyrops.
L. obliquus	"	405	Leiostomus obliquus.
L. grunniens	"	405	Pogonias fasciatus.
L. spinosus	"	405	
L. fulvomaculatus	"	406	Hemulon fulvomaculatum.
L. pallidus	"	407	
L. appendix	*Suppl.*	247	Pomotis appendix.
Lophius bufo	*Mem.*	46	Batrachus tau.
L. gibbus	*Suppl.*	325	Chironectes gibbus.

Lophius piscator	*Mem.*	565	Lophius americanus.
Mugil gigas	*Rep.*	18	Pogonias chromis.
M. albula	*Mem.*	447	Mugil albula.
M. grunniens	*Rep.*	16	Pogonias fasciatus.
M. obliquus	"	16	Leiostomus obliquus.
Morone maculata	"	19	Pomotis vulgaris.
M. rufa	"	18	Labrax rufus.
M. flavescens	"	18	Perca flavescens.
Ophidium mucronatum	*Mem.*	361	Gunnellus mucronatus.
O. barbatum	"	362	Ophidium marginatum.
Perca mitchilli	"	413	Labrax lineatus.
P. varia	"	414	Centropristes nigricans.
P. vitrea	*Suppl.*	247	Lucioperca americana.
Petromyzon marinus	*Mem.*	461	Petromyzon americanus.
Pleuronectes mollis	"	388	Achirus mollis.
P. aquosus	"	389	Pleuronectes maculatus.
P. maculatus	*Rep.*	9	Id.
P. apoda	*Suppl.*	244	Monochirus.
P. hippoglossus	*Mem.*	386	Hippoglossus vulgaris.
P. planus	"	387	Platessa plana.
P. dentatus	"	390	P. dentata.
P. oblongus	"	391	P. oblonga.
P. melanogaster	"	390	P. plana (reversed).
Polynemus tridigittatus	"	449	Trigla cuculus.
P. sexradiatus	*Suppl.*	323	Dactylopterus volitans.
Raia torpedo	*Mem.*	476	Torpedo ——?
R. ocellata	"	477	Raia ocellata.
R. diaphanes	"	478	R. diaphanes.
R. centroura	"	479	Pastinaca hastata.
R. bonasus	"	479	Rhinoptera quadriloba.
R. erinaceus	*Am. Jour.* 9,	290	Raia erinaceus.
R. lævis	*Suppl.*	327	R. lævis.
Roccus striatus	*Rep.*	25	Labrax lineatus.
R. comes	"	26	Otolithus regalis.
Salmo salar	*Mem.*	435	Salmo salar.
S. amethystus	*Ac. Sc.* 1,	410	S. amethystus.
S. fontinalis	*Mem.*	435	S. fontinalis.
S. eperlanus	"	435	Osmerus eperlanus.
S. clupeiformis	*Suppl.*	321	Corregonus clupeiformis.
Scomber grex	*Mem.*	422	Scomber grex.
S. vernalis	"	423	S. vernalis.
S. plumbeus	"	424	Temnodon saltator.
S. hippos	*Suppl.*	246	Caranx punctatus.

Scomber ductor	*Mem.*	424	Naucrates neoboracensis.
S. crysos	"	424	Caranx chrysos.
S. maculatus	"	426	Cybium maculatum.
S. zonatus	"	427	Seriola zonata.
S. sarda	"	428	Pelamys sarda.
Sciena nebulosa	"	408	Umbrina alburnus.
S. fusca	"	409	Pogonias chromis.
S. gigas	"	412	Id.
S. imberbis	"	411	Corvina ocellata.
Scorpena flava	"	382	Hemitripterus americanus.
S. purpurea	*Suppl.*	245	Id.
S. rufa	"	245	Id.
Silurus catus	*Mem.*	433	Pimelodus catus.
S. marinus	"	433	Galeichthys marinus.
S. gyrinus	*Suppl.*	322	Pimelodus?
Sparus ovis	*Mem.*	392	Sargus ovis.
Squalus zygæna	"	482	Zygæna malleus.
S. vulpes	"	482	Carcharias vulpes.
S. americanus	"	483	Scyllium?
S. punctatus	"	483	Lamna punctata.
S. littoralis	*Suppl.*	328	Carcharias littoralis.
S. maximus	*Mem.*	486	Selachus maximus.
S. canis	"	486	Mustelus canis.
Stomodon bilinearis	*Rep.*	7	Merlucius vulgaris.
Stromateus cryptosus	*Mem.*	365	Rhombus triacanthus.
S. longipinnis	"	366	R. longipinnis.
Syngnathus typhle	"	475	Syngnathus fasciatus.
S. hippocampus	"	475	Hippocampus hudsonius.
Tautoga niger	*Rep.*	23	Tautoga americana.
Tetrodon curvus	*Mem.*	472	Tetraodon curvus.
T. turgidus	"	473	T. turgidus.
T. mathematicus	"	474	T. lævigatus.
T. argenteus	"	364	Trichiurus lepturus.
Trigla lineata	"	430	Prionotus lineatus.
T. palmipes	"	431	P. carolinus.
Xiphias gladius	*Suppl.*	242	Xiphias gladius.
Zeus capillaris	*Mem.*	383	Argyreiosus capillaris.
Z. rostratus	"	384	A. vomer.
Z. setapinnis	"	384	Vomer brownii.
Z. spinosus	*Suppl.*	246	Trachinotus spinosus.
Z. geometricus	"	245	Blepharis.

APPENDIX B.

The Spotted Wrymouth (p. 63), has been recently discovered by the Rev. Mr. Linsley on the shores of Long Island sound, near Stratford, Connecticut.

APPENDIX C.

Under the article Mossbonker, (p. 260), I should have stated more correctly that a wagon load usually contains two thousand fish, and consequently that the number of these fish captured at Bridgehampton amounted to 168,000. I take this occasion to add, that this fish is frequently known, on Long island, under the name of *White-fish.*

APPENDIX D.

Since the preceding sheets were printed, we have received the sixteenth volume of the *Histoire Naturelle des Poissons*, de MM. CUVIER et VALENCIENNES. In this volume we find a genus of Cyprinidæ, hitherto undescribed, from this country.

GENUS GOBIO. *Cuvier.*

Dorsal and anal short, and without spines. Pharyngeal teeth conic, feebly bent at their summits, and in two series. Barbels at the angles of the mouth.

THE NIAGARA GUDGEON.

GOBIO CATARACTÆ.

Le Goujon des Cataractes. CUV. et VAL. Hist. des Poissons, Vol. 16, p. 315, pl 483.

Description. Body elongated and rounded. Height of the body half the length of the head, and one-eighth of the total length. Eye moderately large, and on the upper part of the cheek. Snout obtuse. Mouth beneath, with thick lips, but without a veil, as in the *Catostomus*. A barbel at each angle of the mouth, so small as to be perceived with difficulty. The dorsal, in the middle of its length, is small; caudal emarginate, and with rounded lobes; anal rounded, and larger than the dorsal; ventrals small, but with large pectorals. D. 3.6; A. 2.6; C. 19. Scales small, smooth, not striated, with seventy in a longitudinal series. Back deep grey, passing into plumbeous, and becoming silvery on the belly. Pectoral, dorsal and caudal grey; ventrals and anal white. Length five inches.

[Communicated to Cuvier by Milbert, from the Falls of Niagara.]

As the name of *Labeo oblongus* has been applied by MM. Cuvier and Valenciennes to a species from Java, we propose to change our *L. oblongus* to *elongatus*.

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Fig. 130. The River Mooneye (Hyodon tergisus).
131. The Saury (Elops saurus).
132. The Spotted Thread Herring (Chatœssus signifer).

PLATE XLII.

Fig. 133. The Mullet Sucker (Catostomus aureolus).
134. The Pigmy Dace (Leuciscus pygmæus).
135. The Many-spined Stickleback (Gasterosteus occidentalis).
136. The Brilliant Chubsucker (Labeo oblongus).

PLATE XLIII.

Fig. 137. The Flat-nosed Bony Pike (Lepisosteus platyrhincus).
1. Upper view of the head. 2. Scales. 3. Anomalous tooth.
138. The Haddock (Morrhua æglefinus).
139. The Buffalo Bony Pike (Lepisosteus bison).

PLATE XLIV.

Fig. 140. The American Cod (Morrhua americana).
141. The Power Cod (M. minuta).
142. The Tom Cod or Frost-fish (M. pruinosa).
143. The Cusk (Brosmius vulgaris).

PLATE XLV.

Fig. 144. The Coal-fish (Merlangus carbonarius).
145. The Plain Burbot (Lota inornata).
146. The Green Pollack (Merlangus leptocephalus).
147. The New-York Pollack (M. purpureus).

PLATE XLVI.

Fig. 148. The American Hake (Merlucius albidus).
149. The Spotted Codling (Phycis punctatus).
150. The American Codling (P. americanus).

PLATE XLVII.

Fig. 151. The Spotted Turbot (Pleuronectes maculatus).
152. The Long-toothed Flounder (Platessa ocellata).
153. The Pigmy Flat-fish (Platessa pusilla).

PLATE XLVIII.

Fig. 154. The New-York Flat-fish (Platessa plana).
155. The Rusty Flat-fish (P. ferruginea).
156. The Oblong Flounder (P. oblonga).

PLATE XLIX.

Fig. 157. The Halibut (Hippoglossus vulgaris).
158. Platessa plana, reversed and doubled.
159. The New-York Sole (Achirus mollis).

PLATE L.

Fig. 160. The Small Black Bass (Labrax nigricans).
161. The Two-spined Toad-fish (Batrachus celatus.)
a. Dorsal view of the same.
162. The Champlain Pickering (Pileoma fasciatum).
163. The Yellow Pike-perch (Lucioperca americana).

PLATE LI.

Fig. 164. The Lake Mooneye (Hyodon clodalus).
165. The White Lake Bass (Labrax albidus).
166. The Common Pond-fish (Pomotis vulgaris).

PLATE LII.

Fig. 167. The American Sand Launce (Ammodytus americanus).
168. The Spotted Burbot (Lota maculosa).
169. The New-York Ophidium (Ophidium marginatum).
170. The Great Lake Catfish (Pimelodus nigricans).

PLATE LIII.

Fig. 171. The Hudson-river Sea Horse (Hippocampus hudsonius).
172. The American Conger (Conger americanus).
173. The Common New-York Eel (Anguilla tenuirostris).

PLATE LIV.

Fig. 174. The Banded Pipe-fish (Syngnathus fasciatus).
175. The Lump-fish (Lumpus anglorum).
View of the under side of the same.
176. The Green Pipe-fish (Syngnathus viridescens).
177. The White-tailed Remora (Echeneis albicauda).

PLATE LV.

Fig. 178. The Common Puffer (Tetraodon turgidus).
179. The Small Globe-fish (Acanthosoma carinatum).
180. The Hairy Balloon-fish (Diodon pilosus).
181. The Unspotted Balloon-fish (D. fuliginosus).

PLATE LVI.

Fig. 182. The Lineated Puffer (Tetraodon lævigatus).
183. The Long-finned File-fish (Monocanthus broccus).
184. The Warty Balloon-fish (Diodon verrucosus).
185. The Spot-striped Balloon-fish (D. maculato-striatus).

PLATE LVII.

Fig. 186. The Orange File-fish (Monocanthus aurantiacus).
187. The Massachusetts File-fish (M. massachusettensis).
188. The Dusky Balistes (Balistes fuliginosus).

PLATE LVIII.

Fig. 189. The Sharp-nosed Sturgeon (Acipenser oxyrhincus).
View of under side, and head viewed from above.
190. The Dromedary Trunk-fish (Lactophrys camelinus).
191. The Lake Sturgeon (Acipenser rubicundus).

PLATE LIX.

Fig. 192. The Long-tailed Unicorn-fish (Aluteres cuspicauda).
193. The Short Head-fish (Orthagoriscus mola).
194. The Thread File-fish (Monocanthus setifer).

PLATE LX.

Fig. 195. The La Fayette (Leiostomus obliquus).
196. The Northern Barracuta (Sphyræna borealis).
197. The Banded Sand Launce (Ammodytes vittatus).
198. The Common Shad Salmon (Corregonus clupeiformis).

PLATE LXI.

Fig. 199. The Thresher Shark (Carcharias vulpes).
200. The Small Blue Shark (C. ceruleus).
201. The Dusky Shark (C. obscurus).
202. The Nurse (Scymnus brevipinna).

PLATE LXII.

Fig. 203. The American Angel-fish (Squatina dumerili).
204. The Hammer-headed Shark (Zygæna malleus).
a. Underside. *b*. A tooth.
205. The Long-tailed Porbeagle (Lamna caudata).
a. Under side of the head. *b*. A tooth.

PLATE LXIII.

Fig. 206. The Mackerel Porbeagle (Lamna punctata).
207. 1, Head of the same; 2, tail; 3, front tooth of the upper jaw; 4, do of the lower jaw; 5, a lateral tooth.
208. The Basking Shark (Selachus maximus).

PLATE LXIV.

Fig. 209. The American Hound-fish (Mustelus canis).
209 *a*. Under side of the head of the same.
210. The Spiny Dog-fish (Spinax acanthias).
210 *a*. Under side of the head of the same.
211. The Small Lamprey (Petromyzon appendix).

PTATE LXV.

Fig. 212. The Spotted Ray, male, (Raia ocellata).
213. The Broad Sting Ray (Pastinaca maclura).
214. The Whip Sting Ray, female, (P. hastata).
a. Egg case with its embryo.

PLATE LXVI.

Fig. 215. The Prickly Ray, male, (Raia americana).
216. The American Sea Lamprey (Petromyzon americanus).
a. View of the mouth.
217. The Cow-nose Ray (Rhinoptera quadriloba).
a. Tabular teeth of the same.

PLATE LXVII.

Fig. 218. The Clear-nose Ray, male and female, (Raia diaphanes).
219. The Devil-fish (Cephaloptera vampirus).

PLATE LXVIII.

Fig. 220. The Rough-headed Yellow Perch (Perca granulata).
221. The Canadian Pike-perch (Lucioperca canadensis).
222. The Sharp-nosed Yellow Perch (Perca acuta).

PLATE LXIX.

Fig. 223. The Growler (Grystes salmoides).
224. The Black Huron (Huro nigricans).

PLATE LXX.

Fig. 225. The Red Gurnard (Trigla cuculus).
226. The Spinous Gurnard (Prinotus tribulus).
227. The Spotted Sea Scorpion (Scorpæna bufo).

PLATE LXXI.

Fig. 228. The Rhomboidal Porgee (Sargus rhomboides).
229. The Aculeated Gilt-head (Chrysophrys aculeata).

PLATE LXXII.

Fig. 230. The Banded Corvino (Micropogon costatus).
231. The Southern King-fish (Umbrina coroides).

PLATE LXXIII.

Fig. 232. The Spotted Cybium (Cybium maculatum).
233. The Spotted Caranx (Caranx punctatus).
234. The Surgeon (Acanthurus phlebotomus).

PLATE LXXIV.

Fig. 235. The Common Pilot-fish (Naucrates ductor).
236. The Slender Silverside (Atherina menidia).
237. The Greenish Seriole (Seriola cosmopolita).

PLATE LXXV.

Fig. 238. The Rostrated Argyreiose (Argyreiosus vomer).
239. The Long-finned Harvest-fish (Rhombus longipinnis).

PLATE LXXVI.

Fig. 240. The White-fish (Corregonus albus).
241. The Mackinaw Salmon (Salmo amethystus).

Plate LXXVII.

Fig. 242. The Large-scaled Sucker (Catostomus macrolepidotus).
243. The Long-finned Chubsucker (Labeo cyprinus).

Plate LXXVIII.

Fig. 244. The compressed Burbot (Lota compressa).
245. Dorsal view of the same.
246. The Hedgehog Ray, male, (Raia erinaceus).
a. Dorsal view. *b*. Abdominal.

Plate LXXIX.

Fig. 247. Bluish Sea Lamprey (Petromyzon nigricans).
248. Colored Mud Lamprey (Ammocœtes bicolor).
249. Variegated Lamprey (Petromyzon lamottenii).
250. Plain Mud Lamprey (Ammocœtes unicolor).
a. Nostril. *b*. Under side of the mouth.

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